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San Juan Basin Action Plan

VISUAL RESOURCES TECHNICAL REPORT

for the
**Environmental Impact Statement
on Public Service Company of New Mexico's
Proposed New Mexico Generating Station
and Possible New Town**

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Santa Fe, New Mexico

October 1982

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BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

IN REPLY REFER TO
NM30840EIS
1792.73(934A)

October 1982

Dear Interested Citizen:

Attached is one of twenty-two technical reports developed as a basis for writing the Environmental Impact Statement on Public Service Company of New Mexico's Proposed New Mexico Generating Station and Possible New Town (NMGS EIS). (A list of the technical reports is attached.)

These technical reports provide detailed information on the existing environment, methods used for the impact analysis, and related data supportive of the analysis and conclusions presented in the EIS. These reports should be retained for use with the Draft and Final EIS and other documents related to BLM's San Juan Basin Action Plan (SJBAP).

The Draft NMGS EIS will be filed with the Environmental Protection Agency and released for public review on November 30, 1982. Comments on the Draft EIS will be due by close of business February 7, 1983, at the BLM New Mexico State Office. Because of the large volume of material presented in the technical reports, the BLM is distributing these reports in advance of the Draft EIS to provide sufficient time for public review. The technical reports will be available for public review at the places indicated on the attached list. Copies will also be available from the BLM New Mexico State Office, U.S. Post Office and Federal Building, Santa Fe, for a copy fee.

Informational public meetings are scheduled for December 1982 to provide a public forum to clarify questions and concerns about the SJBAP proposals and the related environmental documents, which will all have been issued by that time. The meetings are scheduled as follows:

- December 14, Civic Center, Farmington, 3 to 9 PM
- December 14, Convention Center, Albuquerque, 3 to 9 PM
- December 15, Chapter House, Crownpoint, 3 to 9 PM
- December 16, Holiday Inn, Gallup, 3 to 9 PM
- December 16, Kachina Lodge, Taos, 3 to 9 PM

In addition, formal public hearings will be held in January 1983 to solicit public comments on the SJBAP Proposals. These meetings are scheduled as follows:

- January 10, Chapter House, Crownpoint, beginning at 1:00 PM
- January 12, Civic Center, Farmington, beginning at 9:00 AM
- January 14 (and 15th if necessary because of the number of registrants), Four Seasons Motor Lodge, Albuquerque, I-40 and Carlisle Blvd., beginning at 9:00 AM (each day)

Questions on the public meetings, hearings, and the technical reports themselves should be directed to:

Leslie M. Cone
NMGS Project Manager
BLM, New Mexico State Office
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6184 FTS 476-6184

Sincerely yours,

Charles W. Luscher

Charles W. Luscher
State Director, New Mexico

List of Technical Reports

1. Purpose and Need
2. Project Description
3. Alternatives to the Project
4. Site Alternatives
5. Permit Reconnaissance
6. Air Quality
7. Geologic Setting
8. Mineral Resources
9. Paleontology
10. Soils, Prime and Unique Farmlands
11. Hydrology
12. Water Quality
13. Vegetation
14. Wildlife and Aquatic Biology
15. Threatened and Endangered Species
16. Cultural Resources
17. Visual Resources
18. Recreation Resources
19. Wilderness Values
20. Transportation
21. Social and Economic Conditions
22. Land Use Controls and Constraints

Availability of Technical Reports for Public Review

Individual copies of the technical reports can be obtained for a copy fee. Inquiries should be directed to:

Bureau of Land Management, New Mexico State Office
Title Records and Public Assistance Section (943B)
U.S. Post Office and Federal Building
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6107 FTS 476-6107

Copies of the reports are available for public review at the locations listed below. [Formal and informal cooperating agencies are denoted by an asterisk (*).]

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New Mexico State Office

NMGS Project Staff (934A)
Room 122, Federal Building
Cathedral Place
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6184 FTS 476-6184

San Juan Energy Projects Staff (911)
Room 129, Federal Building
Cathedral Place
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6226 FTS 476-6226

Public Affairs Staff (912)
Room 2016
U.S. Post Office and Federal Building
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Santa Fe, NM 87501
(505) 988-6316 FTS 476-6316

Division of Resources(930)
509 Camino de los Marquez, Suite 3
P.O. Box 1449
Santa Fe, NM 87501
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P.O. Box 6770
Albuquerque, NM 87107
(505) 766-2455 FTS 474-2455

Farmington Resource Area Headquarters
900 La Plata Road
P.O. Box 568
Farmington, NM 87401
(505) 325-3581

Taos Resource Area Office
Montevideo Plaza
P.O. Box 1045
Taos, NM 87571
(505) 758-8851

Socorro District Office

198 Neel Avenue
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Socorro, NM 87801
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Las Cruces District Office

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Las Cruces, NM 88001
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Roswell, NM 88201
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114 S. Halagueno Street
P.O. Box 506
Carlsbad, NM 88220
(505) 887-6544

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Division of Rights-of-Way (330)
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Santa Fe, NM 87503
(505) 827-5217, ext. 2416

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525 Camino de los Marquez
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Santa Fe, NM 87503
(505) 827-3326

New Mexico Historic Preservation Bureau*
State Historic Preservation Officer
505 Don Gasper Avenue
Santa Fe, NM 87503
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Villagra Building
Santa Fe, NM 87503
(505) 827-5531

New Mexico Public Service Commission*
Bataan Memorial Building
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(505) 827-3361

New Mexico State Engineer's Office*
Bataan Memorial Building
Santa Fe, NM 87503
(505) 827-2423

New Mexico State Planning Office*
505 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827-5191

OTHER ORGANIZATIONS

Public Service Company of New Mexico
Alvarado Square
P.O. Box 2268
Albuquerque, NM 87158
(505) 848-2700

Woodward-Clyde Consultants, Inc.
3 Embarcadero Center, Suite 700
San Francisco, California 94111
(415) 956-7070

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Reading copies of the NMGS EIS and associated technical reports will be available at the following public and university libraries:

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501 Copper Avenue NW
Albuquerque, NM 87102

Aztec Public Library
201 W. Chaco
Aztec, NM 87401

Crownpoint Community Library
c/o Lioness Club, P.O. Box 731
Crownpoint, NM 87313

Cuba Public Library
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Cuba, NM 87027

Farmington Public Library
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Farmington, NM 87401

Gallup Public Library
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Santa Fe, NM 87503

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Bureau of Indian Affairs*
Eastern Navajo Agency
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Crownpoint, NM 87313
(505) 786-5228

Bureau of Indian Affairs*
Navajo Area Office
Box M - Mail Code 305
Window Rock, AZ 86515
(602) 871-5151 FTS 479-5314

Bureau of Reclamation*
Upper Colorado Regional Office
125 S. State Street
P.O. Box 11568
Salt Lake City, UT 84147
(801) 524-5463 FTS 588-5463

Minerals Management Service*
South Central Region
505 Marquette Avenue NW, Suite 815
Albuquerque, NM 87102
(505) 766-1173 FTS 474-1173

Minerals Management Service*
Resource Evaluation Office
411 N. Auburn
Farmington, NM 87401
(505) 327-7397 FTS 572-6254

National Park Service*
Southwest Regional Office
1100 Old Santa Fe Trail
Santa Fe, NM 87501
(505) 988-6375 FTS 476-6375

National Park Service*
Environmental Coordination Office
Pinon Building, 1220 St. Francis Drive
P.O. Box 728
Santa Fe, NM 87501
(505) 988-6681 FTS 476-6681

U.S. Fish and Wildlife Service*
Field Supervisor, Ecological Services
3530 Pan American Highway, Suite C
Albuquerque, NM 87107
(505) 766-3966 FTS 479-3966

U.S. Geological Survey (WRD)*
505 Marquette Avenue, Room 720
Albuquerque, NM 87101
(505) 766-2810 FTS 474-2817

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Region VI
1201 Elm Street
Dallas, TX 75270
(214) 767-2716 FTS 729-2716

Navajo Tribe*
c/o Division of Resources
P.O. Box 308
Window Rock, AZ 86515
(602) 871-6592

Pueblo of Zia*
General Delivery
San Ysidro, NM 87053
(505) 867-3304

Soil Conservation Service*
424 N. Mesa Verde
Aztec, NM 87410
(505) 334-9437

U.S. Corps of Engineers*
P.O. Box 1580
Albuquerque, NM 87103
(505) 766-2657 FTS 474-2657

USDA, Forest Service*
717 Gold Avenue
Albuquerque, NM 87102
(505) 474-1676 FTS 474-1676

USDA, Forest Service*
District Ranger
Mt. Taylor Ranger District
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Grants, NM 87020
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Farmington, NM 87401

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Gallup, NM 87301

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VISUAL RESOURCES TECHNICAL REPORT

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Environmental Impact Statement
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Proposed New Mexico Generating Station
and Possible New Town

Prepared by

Woodward-Clyde Consultants

for the

U.S. Department of the Interior
Bureau of Land Management

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NEW MEXICO GENERATING STATION

1.0
INTRODUCTION

BACKGROUND

Included in the recent Council on Environmental Quality Regulations (1979) are several important objectives to reduce excessive paperwork in the preparation of environmental impact statements (EISs):

- Discuss only briefly issues other than significant ones.
- Emphasize the portions of the EIS that are useful to decision makers and the public and reduce emphasis on background material.
- Prepare analytic rather than encyclopedic EISs.

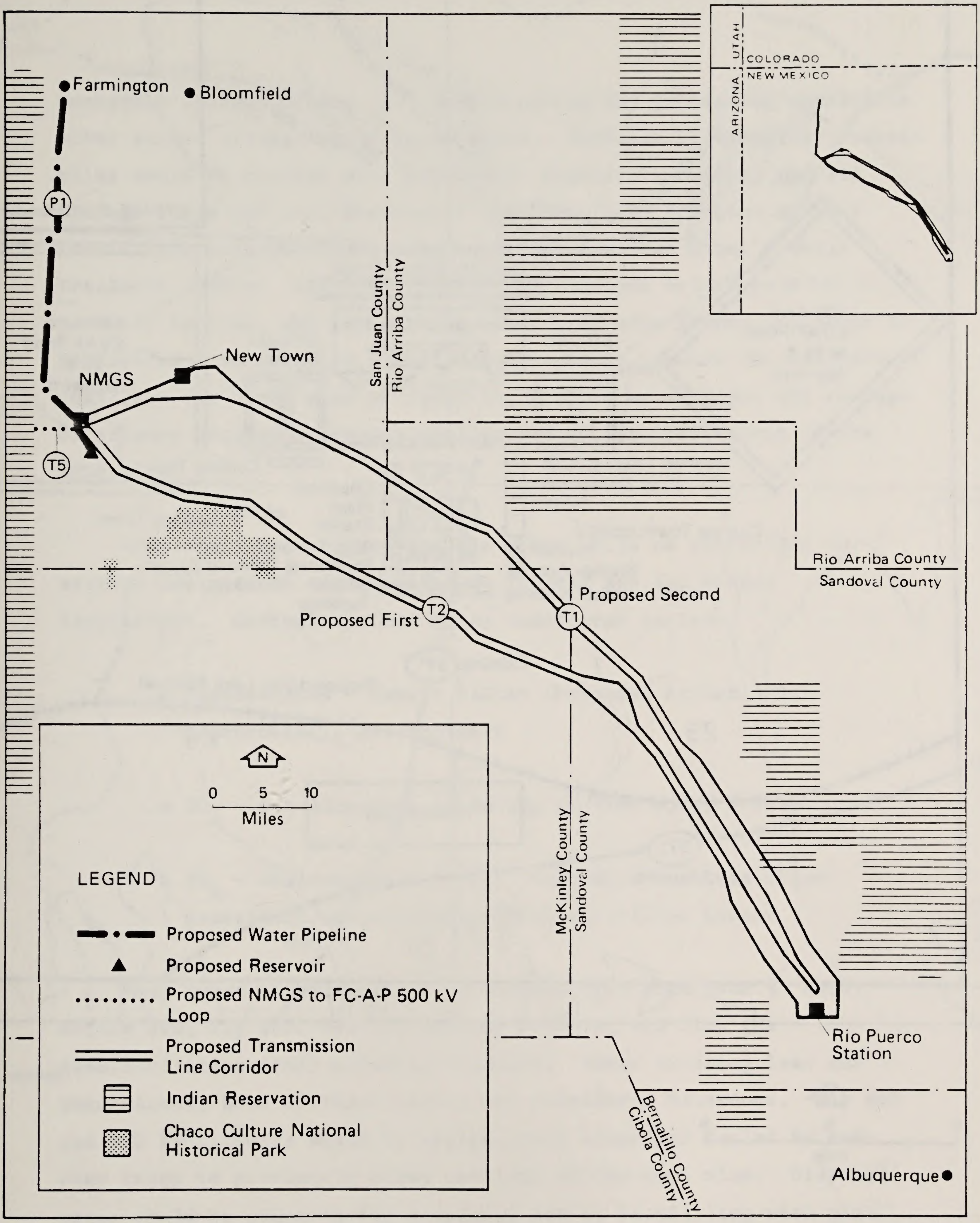
In order to accomplish these objectives and still provide the depth and background required for an analytic impact statement, this technical report has been prepared for the New Mexico Generating Station (NMGS) project. In this report, impacts that were not identified as significant but which are still considered important by the public or technical specialists are analyzed. Background material is provided for those issues and impacts that were considered necessary for the comparison of alternatives. Impacts that were not identified as significant or important by the public and by technical preparers are summarized, and reasons for their elimination from detailed analysis are discussed.

SUMMARY DESCRIPTION OF PROJECT COMPONENTS

Public Service Company of New Mexico (PNM) proposes to construct a 2000-megawatt (MW) coal-fired electric generation plant approximately 35 miles south of Farmington, New Mexico, in San Juan County (Map 1-1). The proposed NMGS, at ultimate development, would have four 500-MW generating units. Each generating unit would include a turbine generator area, coal pulverizer area, boiler area, particulate removal system, SO_2 removal system, and chimney stack. The proposed arrangement of these and other power plant components is shown in Figure 1-1. For the environmental analysis, it was assumed that commercial operation of the first 500-MW unit would begin in 1990 and that other units would start operating during the 1990s.

Coal for NMGS would be acquired through long-term contracts with Sunbelt Mining and Arch Minerals (Proposed Action) or other producers in the San Juan Basin (alternative coal supply). Coal acquired from a joint venture of Sunbelt and Arch Minerals would be supplied from surface mines (referred to as the Bisti mine in this analysis) in the immediate vicinity of the proposed plant site. Coal acquired from other producers in the San Juan Basin would be hauled from mines located as much as 30 miles from the proposed plant site. Coal required for NMGS would average 7.5 million tons per year, or a total of 300 million tons over the 40-year project life.

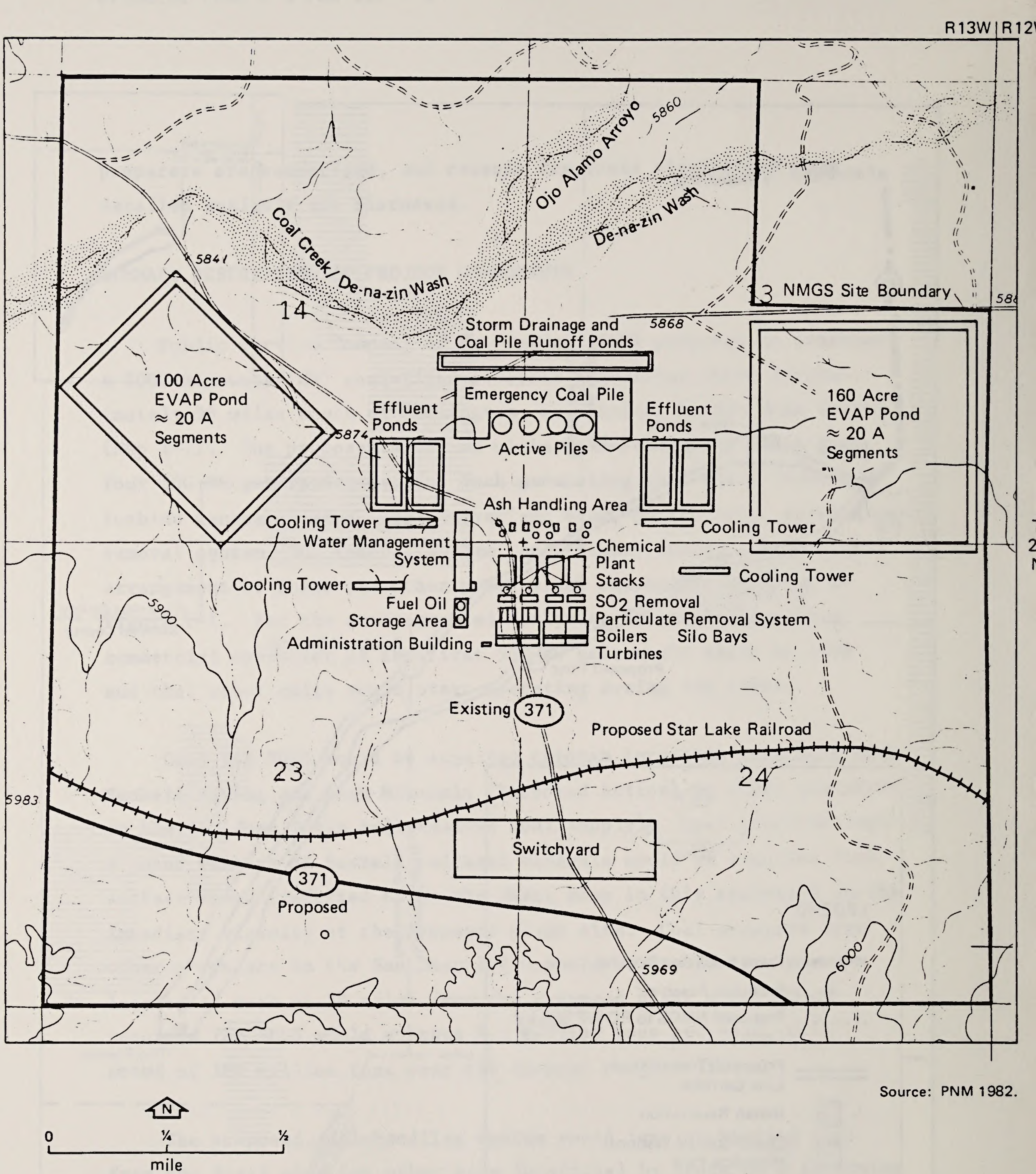
The proposed fuel-handling system would involve hauling coal from the Bisti mine (or other mine locations) by truck to a receiving facility located adjacent to the NMGS site. Coal would then be transferred via conveyor belt from the receiving station to active or



Note: For more information, see the location maps in Appendix G of the EIS.

Source: BLM 1982.

Map 1-1. GENERAL LOCATION OF PROPOSED ACTION



Source: PNM 1982.

Figure 1-1. STATION LAYOUT

emergency storage piles. All coal-handling and processing operations after active storage would be enclosed. Surfaces of emergency storage piles would be treated with a nontoxic stabilizing agent, and all storage piles and coal-processing areas would be designed so that runoff from precipitation would be diverted to the plant's water treatment system. Any coal spills from conveyor belts would be promptly removed, and percolation beneath on-site stockpiles would be controlled. Alternative fuel-handling systems include the delivery of coal from the Bisti mine to receiving station by conveyor and storage of primary crushed emergency coal on Sunbelt property north of the NMGS site.

Atmospheric emissions from the plant would be controlled by systems designed to meet applicable federal and New Mexico regulations. Control systems being considered include:

- Particulates - fabric filter (Proposed Action) and electrostatic precipitator
- SO_2 - wet limestone scrubbing or lime spray drying
- NO_x - dual-register burner, tangentially fired steam generator, or controlled-flow/split-flame burner

Four types of waste would be derived from coal used in NMGS: bottom ash, fly ash, coal pulverizer rejects, and flue gas desulfurization (FGD) products (sludge). Under existing laws and regulations, none of these wastes are considered hazardous. Fly ash and FGD by-products would be mechanically mixed and hauled by end-dump truck to previously mined portions of the coal mine. Disposal areas would be prepared for receiving ash by backfilling with mine overburden. Ash would then be dumped and spread in layers over the mine overburden. After the ash was placed and spread, it would be covered with layers of overburden and surface soil or topsoil and then a vegetative cover would be established. Bottom ash and pulverizer rejects would be collected for disposal in dewatering bins and then hauled by end-dump trucks for disposal into previously mined portions of the coal mine. Procedures for disposal would be the same as for fly ash.

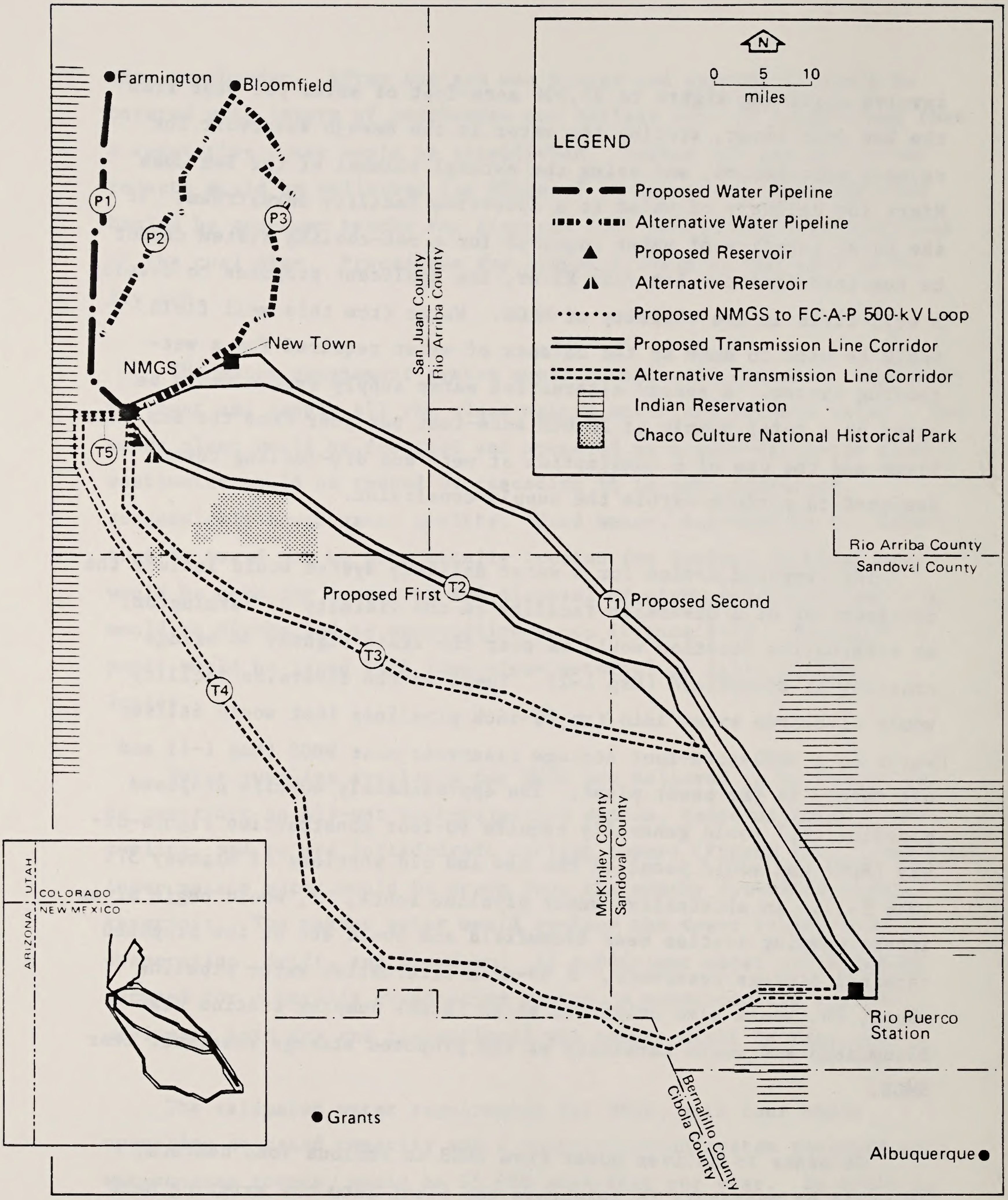
The water management system would contain all equipment necessary to treat and supply all the plant makeup water and potable water. The power plant would be designed and operated as a zero-discharge plant; wastewater would be reused by cascading it to uses requiring successively lower water quality. Used water, degraded to the extent that it could not be economically treated for further in-plant use, would be used for transport and disposal of plant-generated wastes or would be discharged to evaporation ponds (Figure 1-1). Evaporation ponds would be lined with impervious material to limit seepage losses.

Water supplies available for NMGS are believed to be sufficient to construct an all-wet heat-rejection system, based on evaporative cooling, and to use forced-draft cooling towers (Figure 1-1). Cooling-tower makeup water would be drawn from the nearby raw-water storage reservoir. The makeup water would replace the tower losses from evaporation, drift, and blowdown. If sufficient water could not be secured for a totally evaporative system, a water-cooling system employing both dry and conventional wet towers might be required.

The estimated water requirement for NMGS, with four units operating at rated capacity and a heat-rejection system equipped with wet-cooling towers, would be 35,000 acre-feet per year. In order to supply this quantity of water to NMGS, the Proposed Action would involve acquiring rights to 35,000 acre-feet of water per year from the San Juan River, storing the water in the Navajo Reservoir for release upon demand, and using the natural channel of the San Juan River for delivery of water to a diversion facility downstream. If the total quantity of water required for a wet-cooling system cannot be acquired from the San Juan River, the applicant proposes to develop a well field in the vicinity of NMGS. Water from this well field would be used to make up the balance of water required for a wet-cooling system. A second alternative water supply system would be based on a total supply of 20,000 acre-feet per year from the San Juan River and the use of a combination of wet- and dry-cooling towers designed to perform within the supply constraint.

The Proposed Action for a water delivery system would include the construction of a diversion facility in the vicinity of Farmington; an alternative location would be near the State Highway 44 bridge crossing at Bloomfield (Map 1-2). Pumps at the diversion facility would discharge water into two 36-inch pipelines that would deliver water to a 4000-acre-foot storage reservoir near NMGS (Map 1-1) and ultimately to the power plant. The approximately 40-mile proposed pipeline (P1) would generally require 90-foot construction rights-of-way (ROW) and would parallel the new and old portions of Highway 371 (Map 1-1). An alternative water pipeline route, P2, would begin at an intake pumping station near Bloomfield and would end at the proposed terminal storage reservoir. A 49-mile alternative water pipeline route, P3, would also originate at an intake pumping station near Bloomfield and would terminate at the proposed storage reservoir near NMGS.

In order to deliver power from NMGS to various load centers, it would be necessary to integrate the plant into the existing bulk



Note: For more information, see the location maps in Appendix G of the EIS.

Source: BLM 1982.

Map 1-2. GENERAL LOCATION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION transmission systems of PNM and neighboring utilities. Thus the proposed transmission system would consist of a 500-kilovolt (kV) loop linking NMGS with PNM's approved 500-kV Four Corners-Ambrosia-Pajarito (FC-A-P) line, located approximately 5 miles west of NMGS, and two 500-kV lines linking NMGS with the Albuquerque distribution and load center at the proposed Rio Puerco Station (Map 1-1). The NMGS-Albuquerque system would be installed in phases: the 500-kV loop in 1990 with commencement of commercial operation of Unit 1, the first 500-kV line with Unit 2 in 1993, and the second 500-kV line with Unit 4 in 1998.

Four routes are considered technically and economically feasible for construction of the 500-kV transmission system. Route T2 is proposed for the first 500-kV line and route T1 is proposed for the second 500-kV line; routes T3 and T4 are alternatives to the Proposed Action. The total distance traversed would be similar for the two proposed and two alternative corridors: 101 miles (T2), 107 miles (T1), 105 miles (T3), and 126 miles (T4). With the exception of tower sites, the proposed 200-foot ROW could support other compatible land uses, such as grazing. PNM would keep the transmission line ROW closed and would patrol the line by helicopter each month. Lands disturbed by heavy equipment and temporary access roads would be restored to their original condition.

Table 1-1 displays construction work force estimates over time. Construction employment for station facilities would reach peaks of 1515 employees in 1987 and 1530 employees in 1992. Operations employment at station facilities would increase steadily, from 30 employees in 1989 to 900 employees in 1999 when all four units are expected to be on-line.

Table 1-1. NMGS CONSTRUCTION AND OPERATION EMPLOYMENT

Year	Intake Pipeline and Reservoir	500-kV Transmission Line	NMGS										Total Employment	Annual Change
			Construction					Operation						
			Unit 1	Unit 2	Unit 3	Unit 4	Total	Unit 1	Unit 2	Unit 3	Unit 4	Total		
1985	—	—	85	—	—	—	85	—	—	—	—	—	85	+85
1986	—	—	800	—	—	—	800	—	—	—	—	—	800	+715
1987	115	—	1515	—	—	—	1630	—	—	—	—	—	1630	+830
1988	295	104	1180	30	—	—	1505	—	—	—	—	—	1505	-125
1989	—	—	360	450	—	—	914	30	—	—	—	30	944	-560
1990	—	—	100	940	40	—	1080	200	—	—	—	200	1280	+336
1991	—	—	—	750	570	—	1320	250	—	—	—	250	1570	+290
1992	—	—	—	270	1260	—	1530	250	24	—	—	274	1804	+234
1993	—	—	—	105	955	30	1090	250	160	—	—	410	1500	-304
1994	—	78	—	—	325	435	838	250	200	30	—	480	1318	-182
1995	—	—	—	—	90	940	1030	250	200	200	—	650	1680	+362
1996	—	—	—	—	—	775	775	250	200	250	—	700	1475	-205
1997	—	—	—	—	—	255	255	250	200	250	24	724	979	-496
1998	—	—	—	—	—	95	95	250	200	250	160	860	955	-24
1999	—	—	—	—	—	—	0	250	200	250	200	900	900	-55

Source: PNM 1980, unpublished data.

According to PNM (unpublished data, 1980), estimated construction employment skill requirements would be as follows:

Skill	Percent of Total Construction Work Force
Boilermakers	9.4
Pipefitters	14.2
Electricians	14.4
Carpenters	5.6
Ironworkers	10.0
Operators	10.0
Laborers	9.0
Teamsters	4.1
Cement masons	0.8
Millwrights	3.3
Insulators	4.0
Sheetmetal workers	1.1
Painters	1.2
Others	0.5
Supervision	12.4

The above estimates are averaged for construction of all four units.

SAN JUAN BASIN ACTION PLAN OVERVIEW AND RELATIONSHIP OF THE NMGS EIS TO ACTIONS INCLUDED IN THE PLAN

The proposed site for the NMGS is located in the San Juan Basin of northwestern New Mexico. The Bureau of Land Management (BLM) is responsible for the management of much of the land and mineral resources in this area, and currently has six separate but interrelated proposals under consideration within the basin. In order to respond to these, the BLM has developed a San Juan Basin Action Plan (SJBAP). This plan provides for the organizational arrangements whereby the environmental analyses and decision making can be implemented in a timely and efficient manner. The plan describes the process for preparation of three site-specific EISs (including the NMGS EIS) and three Environmental Assessments (EAs):

- Coal Preference Right Lease Applications (EA)
- San Juan River Regional Coal Leasing (EIS)
- Wilderness Study Areas (WSAs) (EIS)
- New Mexico Generating Station (EIS)
- Ute Mountain Land Exchange (EA)
- Bisti Coal Lease Exchange (EA)

In addition to these documents, the action plan provides for the preparation of a Cumulative Overview (CO). The CO is intended to focus on the cumulative impacts that would result from the proposed actions analyzed in the EISs and EAs listed above and therefore to facilitate public review and decision making. As a result of this organization, the impact analysis in the NMGS EIS and technical background reports concentrates on the impacts expected to result from the specific NMGS components proposed. The cumulative impacts expected to result from the proposed NMGS, in addition to the cumulative impacts of other proposals to be developed in the same time period, are described in the CO.

BASELINE CONDITIONS ASSUMED FOR THE NMGS TECHNICAL REPORT IMPACT ANALYSES

The site-specific impact analysis for this technical report was based on the affected environment and available resources that would be existing at the time of construction and operation of the NMGS facility. Since construction at the NMGS facility would not begin until 1985, certain assumptions regarding project development in the San Juan Basin were necessary. Two levels of project development were considered, along with criteria for each, in developing a status for the various non-SJBAP actions proposed for the San Juan Basin area.

- Baseline 1 - The projects considered in this level of development are those that have approval and are to be built or under construction in 1985. This level represents the projected existing environment without the proposals included in the SJBAP.

- Baseline 2 - The projects considered in this level are in some phase of the application stage. In this level, Baseline 1 projects are added to any projects in Baseline 2 along with any revision in resource production or uses (e.g., coal).

Where differences in Baselines 1 and 2 affect the results of impact analyses, discussion is provided. If no differences are identified, it should be assumed that consideration of the two different baselines did not alter the impact analyses.

A complete list of projects and comprehensive location maps for Baselines 1 and 2 are provided in Appendix C of the NMGS EIS.

ORGANIZATION OF THE REPORT

Section 2.0 of this technical report describes the assumptions and methodological approach used in the assessment of potential impacts of the Proposed Action on the affected environment. In addition, Section 2.0 contains a definition of the study area and identification of data sources.

Section 3.0, Affected Environment, contains baseline data on existing conditions in the study area, as well as projections of future conditions without the Proposed Action. Information on historical trends is presented where it is useful in providing a basis for predicting most likely future trends. The description of projected future trends takes into consideration the changes in the environment that are expected to occur as a result of the projects identified in Baseline 1. This provides a reasonable estimate of the future existing environment against which the potential impacts of the Proposed Action and alternatives can be assessed.

Section 4.0 describes the potential effects of implementing the Proposed Action and alternatives. Impacts identified are measured against indicators of significance in order to estimate the importance of the impact to the affected human environment. (Potential impacts associated with alternatives to the Proposed Action are compared in Section 9.0.)

In Section 5.0, mitigation measures are suggested. These measures would help to alleviate the potentially significant adverse impacts or enhance the beneficial impacts identified in the Section 4.0 analysis. Those potentially adverse impacts for which no appropriate mitigation measures have been suggested are discussed in Section 6.0 as "unavoidable adverse impacts."

2.0

FRAMEWORK FOR ANALYSIS

DEFINITION OF TERMS

Visual resources are the physical characteristics of a landscape that determine its scenic quality and relevant value to the viewing public. These characteristics are described according to the line, form, color, and texture of the natural features in the environment (landform, vegetation, water, and soils) that make up a specific landscape. Since scenic quality is a measure of human sensory experience, the visual resources most important to this assessment are those within the "seen area" of both existing and potential areas accessible to people (roadways, rivers, trails, recreation sites, and human developments). The focus of attention is on unusual and high-quality visual resources, such as badlands, scenic vistas, mountainous terrain, steep slopes, natural drainages and waterways, interesting patterns of vegetation, and rock formations that play a dominant role in characterizing a particular scene in the context of the surrounding landscape.

STUDY AREA

The study area for visual resources includes a primary and a secondary zone. The primary zone is the area surrounding each of the project components and alternatives from which visual contrasts resulting from the project features and landscape disturbance could be seen by the human eye at ground level. This zone includes a 12-mile radius around the plant site; a corridor 5 miles wide on each side of the transmission lines; and a corridor 3 miles wide on each side of the water pipelines. (The established 12-mile radius is based on a field study conducted by Woodward-Clyde Consultants, using the Four Corners and San Juan power plants as reference objects. It was concluded that plant facilities of this scale represented a perceivable element in the desert landscape that could adversely affect the scenic quality over a 12-mile range. Although the plant could be seen from more than 20 miles away on clear days, the features are not considered distinguishable enough to result in significant contrasts.)

The secondary zone is included in the analysis to address aerial perspectives and visible plumes emanating from the plant. Because the visual range on an average day in this region has been measured as 108 to 141 miles (Walther and Newburn 1980), the study area was enlarged to encompass sites of critical concern, such as Chaco Culture National Historical Park.

Key references for this task include the following:

- The Management Framework Plan and Visual Resource Management (VRM) inventories and classification for the BLM Chaco Planning Unit

- Previous EISs/EAs and technical studies for the project region: Star Lake-Bisti Regional Coal EIS; the Western Area Survey by PNM; the Environmental Analysis for the New Mexico Generating Station 500-kV transmission line to Rio Puerco; PNM's Proposed Four Corners-Ambrosia-Pajarito 500-kV Transmission Project EIS (1980); and background material for the wilderness suitability study for Bisti, De-na-zin, and Ah-shi-sle-pah Wilderness Study Areas

- BLM scoping meeting results for NMGS
- U.S. Geologic Survey topographic maps (7.5 minute)
- Aerial reconnaissance survey and site visits
- Input from other technical disciplines (particularly socioeconomics, cultural resources, recreation, wilderness, air quality, soils, and biology)

METHOD OF ANALYSIS

The primary reference and method for identifying visual resources for this assessment is the BLM's VRM system. The VRM system has been adopted by BLM to provide a standardized procedure for identifying, evaluating, and classifying visual resources for land management purposes.

The VRM system (BLM 1979a) uses three primary factors in determining the compatibility of proposed developments with the existing natural landscape:

- The inherent scenic quality of the landscape features (visual resources) being viewed
- The sensitivity of the visual resources according to public exposure and public concern
- The viewing distance of the resources from areas of human use and viewing points

The VRM process is detailed in Table 2-1.

Once inventoried for scenic quality, sensitivity, and distance, each BLM planning area is divided into subunits that can be uniformly characterized and assigned a visual management classification. There are five VRM classification designations (described in Table 2-2), ranging from highly valued, pristine landscapes to areas where human modification has so disturbed the natural setting that they need rehabilitation.

Because a portion of the project (alternative transmission line T4) is on public lands managed by the U.S. Forest Service, the second primary reference for this study is the Visual Management System developed for Forest Service use, described in Agriculture Handbook 462 (U.S. Forest Service 1974). The Forest Service inventories its public lands and classifies them according to character types, variety class, and sensitivity level, and develops visual quality objectives (VQO) for each area. The five VQO management levels are defined in Table 2-3. Table 2-4 summarizes the final VRM classes assigned by both the BLM and the Forest Service for landscapes traversed by each component of the proposed project, and Map 2-1 illustrates where project components overlap management classes.

The assessment involved a three-phase effort: a screening process, the completion of the VRM contrast rating, and an evaluation of significant consequences of specific project-related changes to landscape character. The initial screening process narrowed the study region for detailed analyses. The objective of the screening process was to focus on particularly sensitive visual resources and critical viewpoints. The three basic factors encompassed in the VRM

Table 2-1. VRM PROCESS

Step	Description
Landscape Character Inventory	The landscape character, inventoried as scenic quality, is considered to be a product of the form, line, color, and texture of the land and water forms, vegetation, and structures. The specific nature and combination of these conditions determine the variety, harmony, and contrast seen in the landscape as influenced by such variable factors as season, light, scale, distance, etc.
Scenic Quality Rating	The scenic quality part of the inventory documents the character of the landscape through consideration of the condition of seven rating criteria, including landform, vegetation, water, color, man-made modifications, scarcity, and influence of adjacent scenery. From this, an overall level of scenic quality is determined on a rating unit basis. These rating units are delineated around lands of similar character.
Visual Sensitivity Rating	Visual sensitivity is a two-part inventory component used to inventory levels of use volume and user attitudes. Use volume levels are determined for key use areas and travel routes. User attitude is a consideration of the attitudes of the user public toward the visual resource values of an area and their reaction to various types of potential landscape modification.
Distance Zone	Distance zones are delineated from key viewing areas or routes. These zones establish a distance relationship between the viewer and the seen landscape.
Management Classes	Visual Resource Management classes are determined through the combination of the scenic quality, visual sensitivity, and distance zone inventory results. These classes serve as an index to the level of visual resource values and identify acceptable levels of visual modification. They are guidelines which are utilized for multiple use management planning and project environmental assessments.
Contrast Rating	The contrast rating process is used to determine whether a specific project proposal would be within the VRM class limits for that area. It compares the degree of contrast or visual change between the form, line, color, and texture of the existing landform, vegetation, and structures with that proposed. This detail identifies, beforehand, specific causes of the anticipated landscape contrast and therefore serves as a bridge to effective and appropriate mitigation measures.

Table 2-2. VISUAL RESOURCE MANAGEMENT CLASSES FOR BUREAU OF LAND MANAGEMENT LANDS

Class I -	This class primarily provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and similar situations where management activities are to be restricted.
Class II -	Changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.
Class III -	Changes in the basic elements caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.
Class IV -	Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.
Class V -	This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas identified in the scenery evaluation in which the quality class has been reduced because of unacceptable intrusions. It should be considered an interim short-term classification until one of the other objectives can be reached through rehabilitation or enhancement. The desired visual quality objective should be identified.

Source: Bureau of Land Management 1979a.

Table 2-3. VISUAL QUALITY OBJECTIVES FOR U.S. FOREST SERVICE LANDS

Preservation (P)
Provides for ecological changes only.

Retention (R)
In general, human activities should not be evident to the casual visitor.

Partial Retention (PR)
Human activities may be evident but must remain subordinate to the characteristic landscape.

Modification (M)
Human activities may dominate the characteristic landscape but must, at the same time, use naturally established form, line, color, and texture. Development should appear as a natural occurrence when viewed in the foreground or middleground.

Maximum Modification (MM)
Human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Source: U.S. Forest Service 1974.

Table 2-4. VISUAL RESOURCE INVENTORY CLASSES AND MANAGEMENT OBJECTIVES FOR LANDSCAPES OCCUPIED BY PROPOSED PROJECT COMPONENTS (by percent)

Project Component	Visual Quality Variety Class[a]	Sensitivity[b]	Management Objective
New Mexico Generating Station (Plant Site)	100 percent C	100 percent low	100 percent IV
New Town Landscapes	2 percent A (De-na-zin) 98 percent C	100 percent low	2 percent II 98 percent III
Water Pipeline Alternative P1	5 percent A 85 percent B 10 percent C	8 percent low 92 percent high	92 percent III 8 percent IV
Water Pipeline Alternative P2	5 percent A 80 percent B	8 percent low 92 percent high	92 percent III 8 percent IV
Water Pipeline Alternative P3	22 percent A 16 percent B 62 percent C	8 percent low 92 percent high	22 percent II 60 percent III 18 percent IV
Dog Eye Reservoir	100 percent C	100 percent low	100 percent IV
Highway Reservoir	100 percent C	100 percent low	100 percent IV
Well-Field Gathering Pipes	100 percent C	100 percent low	100 percent IV
Transmission Line T2	5 percent A 12 percent B 83 percent C	54 percent low 46 percent high	5 percent II 43 percent III 52 percent IV
Transmission Line T1	4 percent A 96 percent C	28 percent low 72 percent high	5 percent II 30 percent III 65 percent IV
Transmission Line T3	5 percent A 13 percent B 82 percent C	39 percent low 48 percent medium 13 percent high	5 percent II 13 percent III 82 percent IV
Transmission Line T4	38 percent B 62 percent C	24 percent low 64 percent medium 12 percent high	4 percent II 30 percent III 66 percent IV 4 percent MM 89 percent M 7 percent PR

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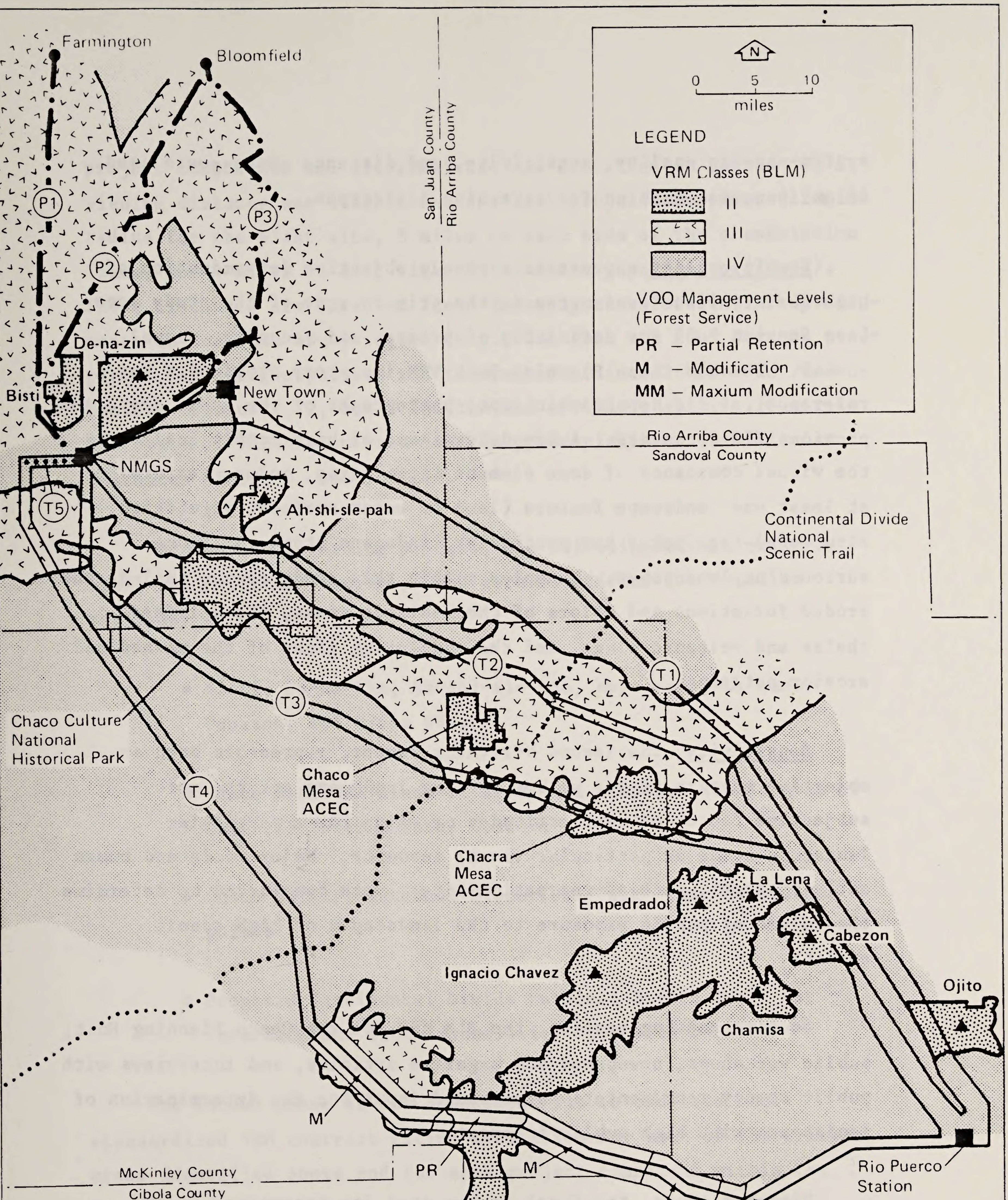
[a] Variety classes are obtained by classifying the landscape into different degrees of variety. There are three variety classes that identify the scenic quality of the natural landscape:

Class A--Distinctive--areas that combine the most outstanding characteristics of each rating factor.
Class B--Common--areas in which there is a combination of some outstanding features and some that are fairly common to the physiographic region.
Class C--Minimal--areas in which the features are fairly common to the physiographic region.

[b] Sensitivity levels are a measure of people's concern for the scenic quality of the landscape.



Source: BLM 1982.

Map 2-1. VISUAL RESOURCE INVENTORY CLASSES AND MANAGEMENT OBJECTIVES system--scenic quality, sensitivity, and distance zones--were used in an iterative fashion for screening landscapes.

Scenic quality represents a purely objective determination of high-quality visual resources in the primary zone of the study area (see Section 1.0) for definition of primary and secondary visual zones). The BLM Chaco Planning Unit VRM inventory provided a key reference, as did topographic maps, photographs of the study area, and previous EIS documents. A key determinant of high scenic quality is the visual dominance of some element (form, line, color, texture) of at least one landscape feature (land or water surface, vegetation, structure) that makes the particular landscape stand out among surrounding landscapes. Examples within this study region include the eroded formations and colors of the badlands areas, the uplifted shales and volcanic plugs, and the undulating lines of the washes and erosion patterns.

Sensitivity, the second screening factor, represents both an objective measure of use volume for the landscape and the more subjective factor of user attitudes or value for a particular landscape scene or particular visual resource. Major roads and human activity areas, such as recreation sites, were considered to determine the volume of public exposure to the landscapes of high scenic quality.

Scoping meeting results, the BLM MFP for the Chaco Planning Unit, public workshops, newspaper and magazine articles, and interviews with public agency representatives provided input for the determination of landscapes with high public interest.

Distance zones, the final factor used for screening, is an indication of the distance from the landscape encompassed by the project components and alternatives. As described in Section 1, a viewing distance was established for each project component (12-mile radius for the plant site, 5 miles on each side of the transmission lines, and 3 miles on each side of the water pipeline corridors). These distances are based on field investigations of similar developments in the same study region (e.g., San Juan and Four Corners power plants, existing pipelines and transmission lines in the San Juan Basin). Photos 1, 2, and 3 (at the end of this chapter) illustrate the scale of visual contrast for the power plants of this size at distances of 12, 6, and 3 miles.

Through the screening process, the following visual resource areas and critical viewing points were identified for detailed analyses:

- Bisti, De-na-zin, Ah-shi-sle-pah, Empedrado, La Lena, Cabezon, and Ojito WSAs
- Chaco Mesa VRM Class II area, and proposed Scenic Area of Critical Environmental Concern
- Chaco Culture National Historical Park--two observation points
- Proposed Continental Divide National Scenic Trail (at intersections with transmission line alternatives)

The second phase of the assessment was to complete the standardized VRM contrast rating evaluation for each of the critical areas identified above and for each project component within the "seen area" of the sites.

In order to better understand the extent of visual contrast likely to result from various project-related consequences, two methods were used for simulating visual change: a photographic technique and a computer-generated graphic technique.

The objective of the photographic technique was twofold: first, to photographically record the affected landscapes as seen from critical viewpoints so that project components could be superimposed on the scene; and second, to record the physical scale at various viewing distances to determine visual sensitivity. The latter task was accomplished by taking photographs of a helicopter hovering above the plant site at the height of the boiler encasement (240 feet) and the top of the stack (up to 575 feet) from three selected viewing points (Bisti WSA, De-na-zin WSA, and the Chaco Culture National Historical Park). Because the helicopter was not detectable from either of the two vantage points at the 575-foot elevation, Chaco Culture National Historical Park was eliminated from the primary zone. (See photo records in Appendix A.)

Woodward-Clyde Consultants' computerized Geographic Information System (GIS) was used to cross-check the site inspection and photographic scaling technique and to provide additional simulation reference data. The topographic elevations of the primary study area, as shown on U.S. Geological Survey Digital Elevation Model tapes, were used to create the data base. Three plant elevations were selected for simulation: 575-foot stack height (representing the worst case),*

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*Stack heights are determined by air quality requirements; for NMGS a range of 400-575 feet is specified. The visual analysis considered a worst-case situation; however, even the minimum height of 400 feet would be visible from the viewing point in the Bisti WSA.

240-foot boiler height, and ground level. Areas of visibility to these points were generated for 400-meter (0.248-mile) grid cells from the tapes. A computer map showing visible and nonvisible areas at each elevation was generated for use in conjunction with distance zone information. The computer maps, plus a more detailed description of the computer process, are included in Appendix B.

The VRM contrast ratings are used to determine the relative change to each landscape element for each project component. This rating scheme allows the reviewer to identify exactly which features will result in the highest visual contrast, and thus to focus on where mitigation measures might be employed. Completed contrast rating forms for each of the critical landscapes and viewing points are presented in Appendix C.

The last phase of the visual assessment--following the screening process, contrast rating, and simulation--is the final determination of significance. The VRM system provides guidance for determining the extent of contrast. Further criteria for judging significance include the duration of the consequence, the potential for reasonable mitigation, and the sensitivity of the change in terms of public interest. For purposes of this study, visual consequences considered to be of short duration (from 2 to 5 years in areas of low to moderate sensitivity) or in areas with limited public exposure were considered insignificant. In addition, in areas where other development (e.g., coal mining, gas exploration) is likely to affect the existing baseline condition in the near future, the visual consequences of the NMGS were considered in the context of overall development and landscape modification.

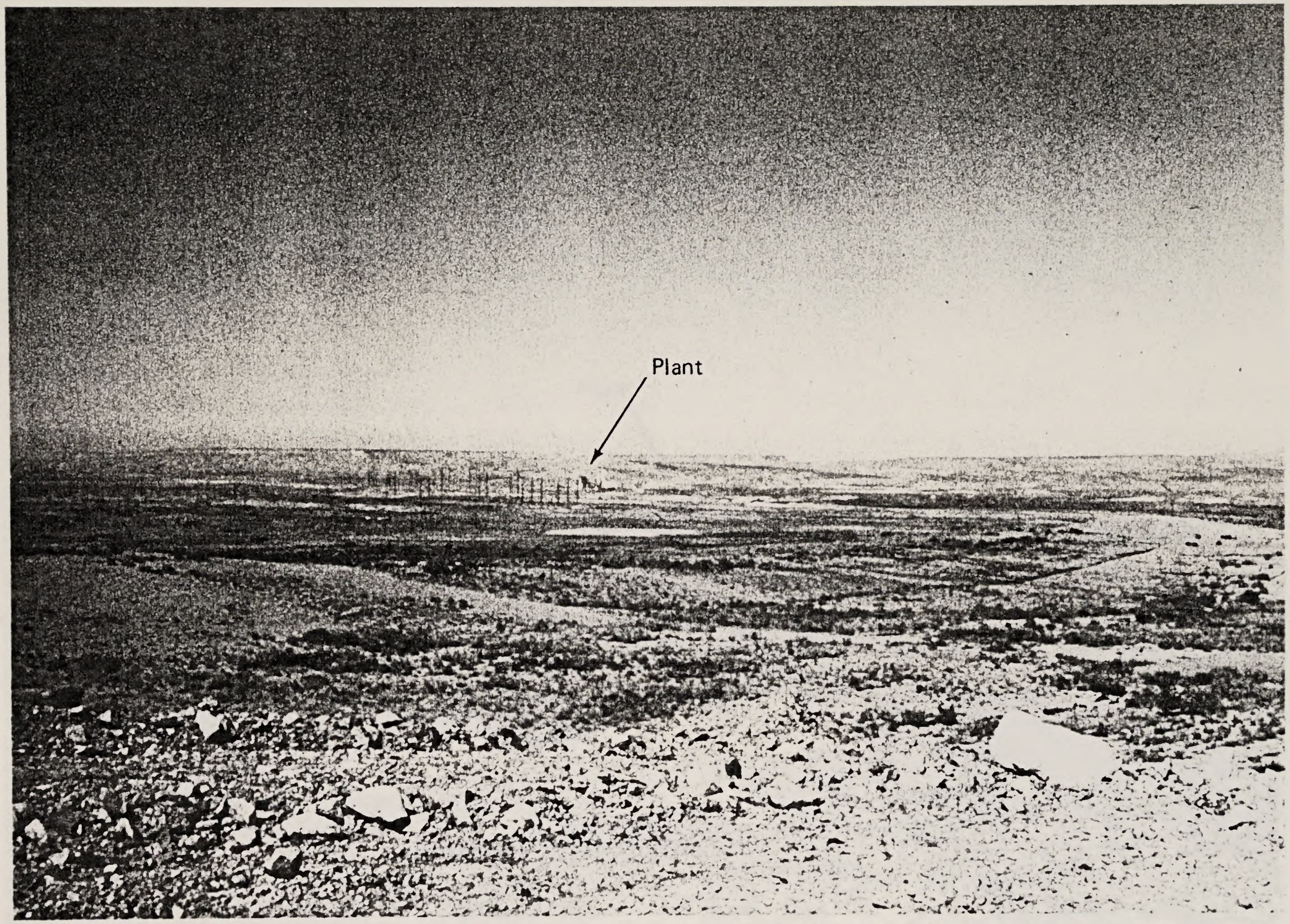

Photo 1. 12 MILES FROM SAN JUAN PLANT

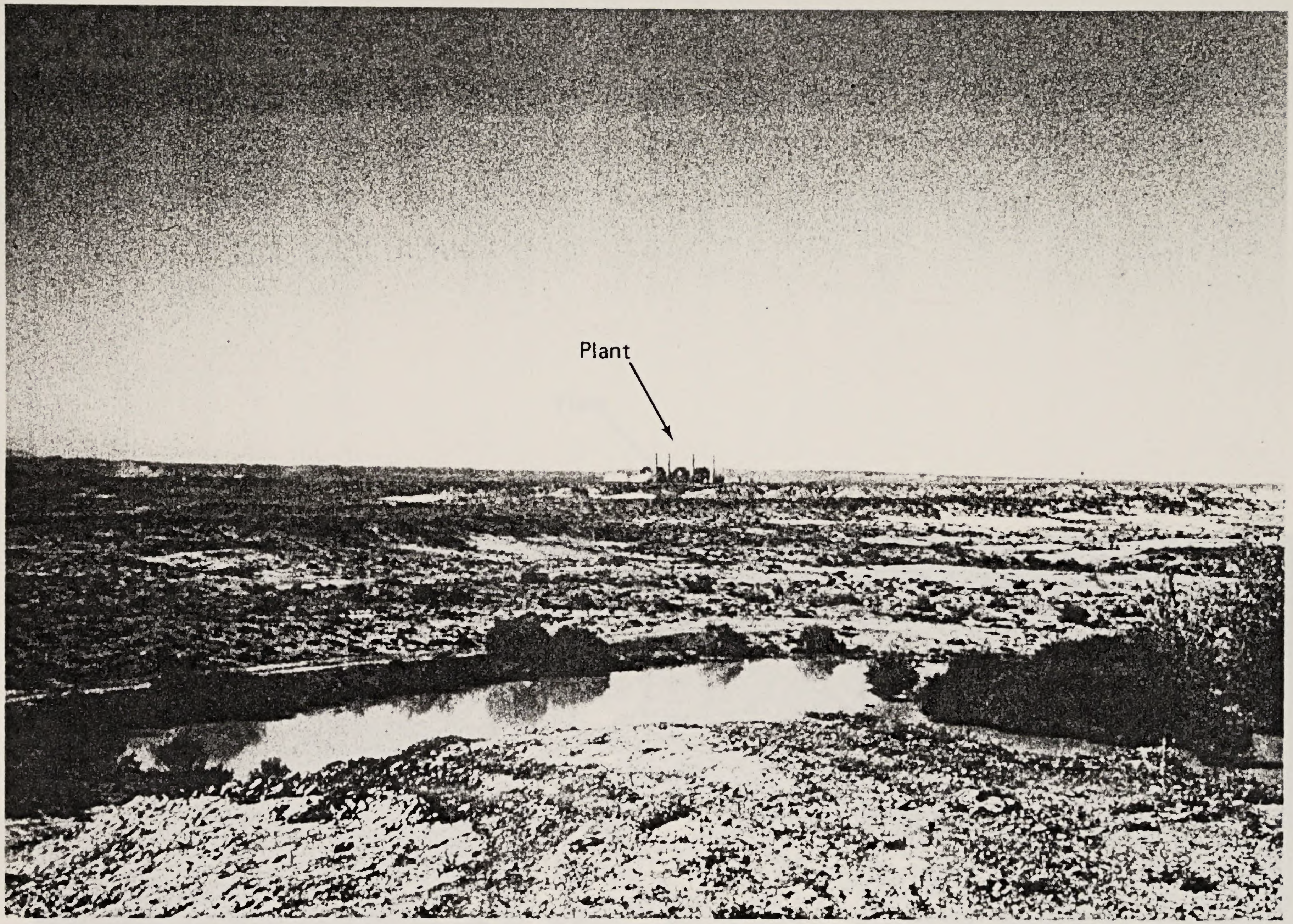

Photo 2. 6 MILES FROM SAN JUAN PLANT

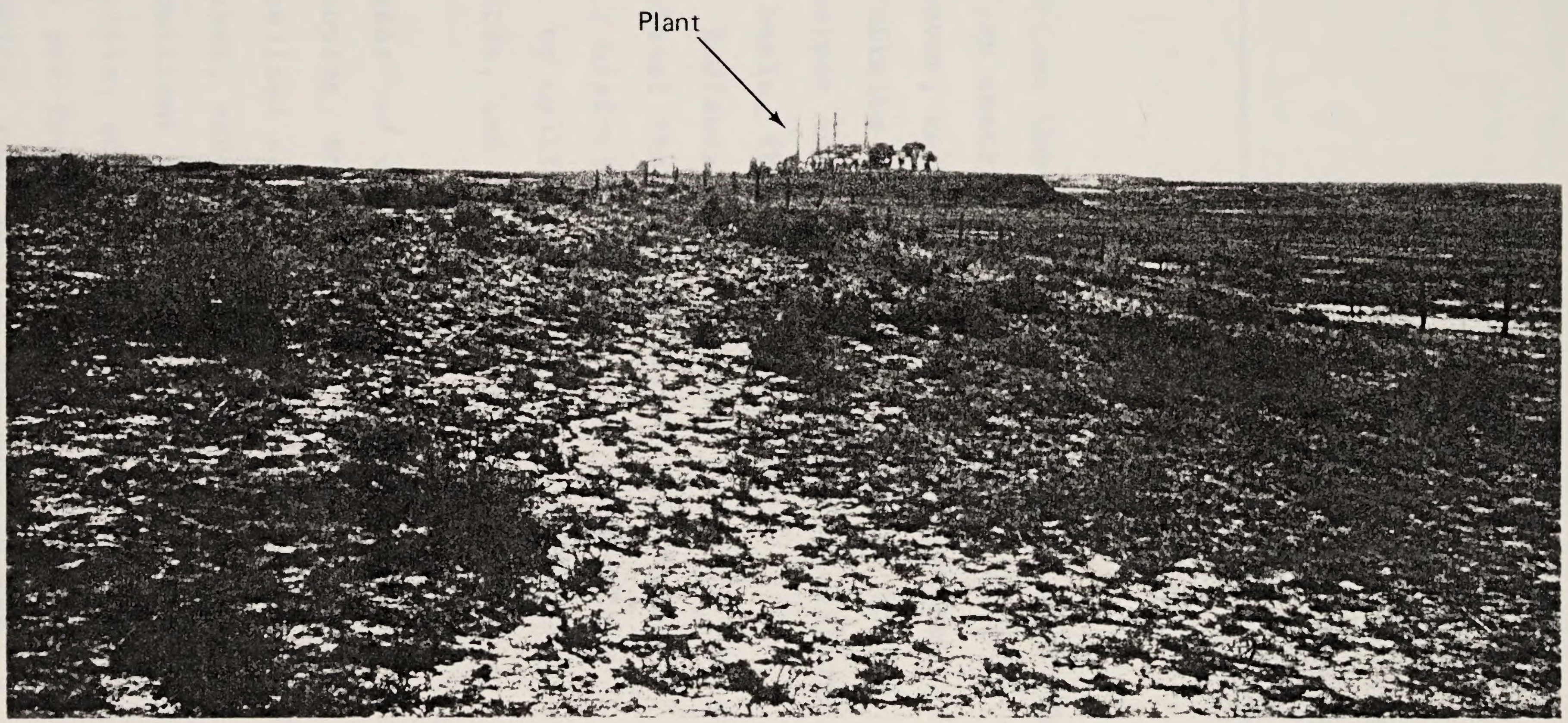

Photo 3. 3 MILES FROM SAN JUAN PLANT

3.0
AFFECTED ENVIRONMENT

REGIONAL DESCRIPTION

The San Juan Basin comprises the majority of the study area (Maps 1-1, 1-2). The region is often described in a generic way as a homogeneous high desert; however, this general characterization largely ignores the area's infinite variety, which includes the ponderosa pine and pinyon-juniper associations of higher elevations in the southern portion of the basin, the eroded "moonscape" characteristics of the Bisti Badlands, and intrusive volcanic cones such as Cabezon Peak. The visual characteristics of the region strongly reflect its geologic history. Where marine sedimentary deposition has been followed by uplift and erosion, a landscape characterized by mesas, cuestas, and pinnacles remains.

Surrounding these "islands" of visual and geologic interest is a landscape of open, gently sloping, and rolling plateaus crossed by arroyos, dirt roads, and localized sandstone outcrops or cuestas. The tans of the sandy soils, washes, and dirt roads prevail, although sparse vegetation adds intermittent green. The landscape exhibits colors of dull gray, tan, purple, and browns. Localized patches of cactus and herbaceous shrubs are found; when in bloom, they add seasonal colors of yellow, white, red, purple, and blue to the landscape. Typical mesic shrubs associated with the Great Basin desert shrubland grow along the arroyos. The conspicuous absence of water is an important visual element in this landscape, as evidenced by the textures and shapes of the washes. Human modifications in the form of year-round residences, seasonal dwellings, and historic and prehistoric ruins are scattered throughout the area. Primary access to the basin is from Highway 371, which is currently undergoing realignment, upgrading, and paving. There are a number of other cultural modifications in the study area, including transmission lines, gas and oil pipelines, range developments, Highway 44, and numerous secondary or dirt roads interlacing scattered residential areas and public and commercial service areas, as well as interconnecting primary access and remote mineral and resource development areas.

The following discussion briefly describes the dominant visual features and overall visual character of the affected environment, as well as the sensitivity of the landscapes and their viewing distance from human use areas.

NEW MEXICO GENERATING STATION SITE

The proposed NMGS site is in the northern desert of New Mexico, 38 miles south of Farmington, occupying sections 3/4 of 13, 14, 23, and 24 of T23N, R13W, along Highway 371. The site is characterized as a natural, open landscape, with gently rolling hills, intermingled with badlands, and surrounded in the distant background by mesas and mountain ranges (Photo 4).* Sandy-clay soils and soft rock, susceptible to erosion, have been sculpted over the years by heavy rains and wind, leaving interesting outcroppings and seldom-seen shapes. Evidence of this phenomenon is pronounced along the southeastern portion of the proposed plant site (Photo 5), which provides the dominant form and line to the close-in landscape.

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*Photos 4 through 10 are at the end of this chapter.

The De-na-zin Wash, also characteristic of this geographic region, traverses the northern portion of the site, providing further definition to the natural contours and drainage patterns of the landscape.

The color and texture of the plant site reflect sandy-clay soil types (muted tones of tan and reddish brown), with intermittent pebble-size outcroppings of coal and shale. Vegetation is sparse, consisting primarily of grasses, scattered saltbush-greasewood, and sagebrush.

The BLM has assigned the landscape to be occupied by the proposed project a scenic quality rating of C. This classification reflects the fact that the landscape features are common to the physiographic region. The visual sensitivity for the site is rated "low" because it is accessible only by an unimproved road at present. It should be noted, however, that Highway 371 is currently being paved, thus improving public access to the area. Also, the proximity of the site to the Bisti Badlands and Bisti Wilderness Study Area (WSA) 3 miles away, could increase sensitivity in the future as this area grows in popularity and public interest. The BLM has classified the plant site landscape as VRM Class IV. This classification allows for changes in the landscape as long as they are subordinate to the original composition and character, and reflect what could be a natural occurrence within the characteristic landscape.

Though the plant site itself has been identified as having low scenic quality and sensitivity, its close proximity to landscapes of high scenic quality and sensitivity has relevance. The proposed plant site is approximately 3 miles southeast of the Bisti WSA and 6 miles from the De-na-zin WSA (Photo 6). The Bisti WSA (Photo 7) possesses high-quality scenic features (BLM rating A), and has therefore been rated a VRM Class II management area. (Landscapes within WSAs would convert to Class I if the areas were to be designated Wilderness by Congress.) The Bisti WSA consists of highly eroded shale and sandstone outcrops. These natural badland formations exhibit rich color variations and unusual form and textures. The badlands are almost totally void of vegetation. The interesting rounded shapes and contours of the eroded portions of the landscape contrast markedly with the barren flatland of the surrounding desert grasslands. The erosion-carved formations are highly valued by nature photograpers. The isolated location, expansive vistas, and general lack of noise or evidence of human activity provide an overwhelming perception of solitude and naturalness. In the case of De-na-zin, the landscape for the proposed plant site provides a backdrop for views to the southwest against the Chuska Mountains. In its most recent Management Framework Plan for the study area, BLM recommended that the Bisti and De-na-zin WSAs be designated as an Area of Critical Environmental Concern (ACEC) and be managed and preserved for future generations to appreciate, because of the scenic, natural, historic, and educational values. (For further detail on the Bisti and De-na-zin WSAs, see the Technical Report on Wilderness Values.) The Bisti WSA has also been nominated for consideration as a National Natural Landmark.

WATER SUPPLY SYSTEM

Water Pipeline Route P1

Most of the proposed water pipeline route P1 would pass through VRM Class III and IV landscapes. A short portion of the pipeline would parallel a Class II area. Most of the pipeline route traverses land that has been given a B visual quality rating. The first few miles traverse the steep, eroded bluffs and mesas along the south side of the San Juan River immediately south of Farmington. These mesas and bluffs exhibit strong form, line, texture, and rich colors where horizontal soil layering is evident. Highway 371 and numerous secondary roads cut through this area, detracting from the natural features of the landscape. Much of the pipeline route from Farmington to the NMGS site passes through land that is characterized by open space with gently rolling hills. The native vegetation consists of mixed grasses, shrubs, and forbs. Colors and texture are predominantly homogeneous, and views are expansive and open.

There are numerous modifications in the area. The Navajo Indian Irrigation Project (NIIP) is a dominant feature of the landscape. This is an area of approximately 110,000 acres and is partially irrigated for farming. The NIIP enhances the landscape with seasonal color variations that contrast noticeably with native vegetation. The area has a B rating for scenic quality; however, this rating is higher than normally attributed under the VRM rating scheme, considering the human-induced modifications of landscape elements. The proposed water pipeline route parallels Highway 371 through the NIIP (Photo 8).

A small percentage of pipeline route P1 passes through a Class A visual quality area. This portion of the route is located along the western border of the Bisti WSA. As mentioned earlier, the Bisti WSA has been recommended for management designation as an ACEC area. Protection of the Bisti Badlands for its visual resources has strong public support.

Water Pipeline Route P2

Most of water pipeline route P2 passes through VRM Classes III and IV; a 3-mile stretch of the route parallels a Class II area. Eighty percent of the route is on land that has a B visual quality rating. Nine of the first 11 miles parallel an existing pipeline (El Paso Natural Gas) route through the Kutz Canyon region along the San Juan River, where topographic relief provides interesting forms and shadows. The proposed pipeline route passes through a region that is characterized by gently sloping or rolling hills and is covered with mixed grasses, forbs, and shrubs. Like the P1 line, the P2 line would pass through NIIP lands.

Of the route's 25 miles that traverse the NIIP, 17 miles would parallel an existing pipeline. Water pipeline alternatives P1 and P2 would follow the same route from just north of the Bisti WSA to the proposed generating station site. Like P1, P2 would be adjacent to the Bisti WSA. This portion of the route, approximately 2 miles long, is in a visual quality Class A area.

Water Pipeline Route P3

The proposed 48.5-mile water pipeline P3 would traverse lands designated VRM Classes II, III, and IV. The first few miles would pass through the Kutz Canyon area, which is characterized by steep slopes of barren badland formations. This landscape exhibits colors of dull gray, tan, purple, and browns. Because of these natural characteristics, the landscape has a B visual quality rating and a VRM Class III rating. Numerous secondary roads and Highway 44 make the visual sensitivity for the area high. The pipeline corridor would traverse Angel Peak Recreation Area between mileposts 14 and 18.

South of the Kutz Canyon area, the landscape consists of strongly sloping to gently rolling uplands with broad, moderately incised valleys. Broad expanses of sagebrush are found within the region. Little color variation exists, and there is little change in texture or form. There are many modifications, including transmission lines, pipelines, range developments, Highway 44, and secondary roads. Approximately 22 miles of the water pipeline corridor would parallel existing highways. Since the landscape in this region has little variety or diversity, it has a VRM Class rating of IV and a visual quality rating of C.

The route of water pipeline P3 parallels the eastern boundary of the De-na-zin WSA, which has a VRM Class II rating and a visual quality A rating. The De-na-zin WSA, like the Bisti, consists of broken, rough badlands. A variety of viewscapes are provided by mesa tops, intricately sculptured bluffs, and rolling alluvial washes. Coloration of these formations ranges from creams and tans to strikingly banded maroons and purples. The proposed pipeline route would parallel an existing secondary road through this visually sensitive area.

Other Components

The water supply system would also include wells, booster pump stations, well-field gathering pipes, 69-kV transmission line for pump stations, and a proposed reservoir. All these components would be located in close proximity to the proposed plant site and along pipeline routes discussed previously and have the same VRM class ratings. The area has a scenic quality rating of C because the landscape features are common to the physiographic region. Visual sensitivity for the area is rated "low" because of poor road access and the isolated, barren nature of the landscape. The VRM rating is a Class IV. The river diversion facility would be similar to the existing facility serving the San Juan Generating Station. Two locations along the San Juan River include the proposed intake, near Farmington (P1), and an alternative, near Bloomfield (P2 and P3).

One of the well-field gathering pipes would pass through the Fossil Forest. Although the Fossil Forest has a Class IV rating, BLM has received many public comments expressing a desire to protect this area for its unusual geologic formations (BLM Management Framework Plan). The final decision in the BLM Chaco MFP on the Fossil Forest involves ACEC designation for the northern portion only. The remainder is to return to multiple use. (Mining is proposed for this area.)

TRANSMISSION LINES

Transmission Line T2

Most of the immediate landscape through which transmission corridor T2 would pass is of low visual quality; however, much of the surrounding landscape forming the middleground and background views is of a high visual quality. Most of the corridor (83 percent) would traverse lands of visual quality C and VRM Class IV. The landform is characterized by gently sloping, broad valleys to rolling and steep uplands with intermingled breaks and badlands. Surface soil color is light sand intermingled with badland areas having dull reds, browns, blacks, and grays. Modifications include existing 345-kV transmission lines, underground pipelines, and secondary roads. Most of the landscape through this area (54 percent) has low visual sensitivity because of the distance from major human developments, poor road access, and lack of public interest, except for isolated attractions such as the WSAs and historic sites.

A portion of corridor T2 is adjacent to Chaco Culture National Historic Park and traverses a park outlier on the northeast side. (For details on the park and outliers see the Cultural Resources Technical Report and the Nonurban Recreation Resources Technical Report.) The main park is within Chaco Canyon, which is characterized by steep canyon walls, escarpments, buttes, and outcrops of eroded shale and sandstone. (Some outliers are outside Chaco Canyon.) Colors typical of the landscape are subtle light browns, tans, and grays, with some greens along the river channel. The landscape has a visual quality Class B rating because of the variety and interest exhibited by the Chaco River in an otherwise common landscape, and its historic significance. This area is also traversed by the Chaco River, which adds natural variety in vegetation (color and texture) to the semiarid surroundings.

The T2 corridor runs adjacent to the southern boundary of the Ah-shi-sle-pah WSA, just north of the Chaco Culture National Historical Park. (Ah-shi-sle-pah was not recommended for Wilderness consideration in the Chaco MFP but will continue to be managed under the Interim Guidelines until congressional action is taken.) Ah-shi-sle-pah has broken, coarse terrain. Spire and mushroom formations contrast with the rounded and rolling lines of the surrounding landscape. Browns, tans, and grays are highlighted by maroon and purple pastel banding. This WSA has a VRM Class II rating, which would revert to a Class III or IV if not designated as Wilderness by Congress. This corridor crosses the proposed route for the Contental Divide National Scenic Trail at approximately milepost (MP) 45. The landscape is characterized by open plains, with little to no vegetation or variety. Colors are the muted earth tones of sandy clay soils.

The transmission line corridor would also cross the proposed Continental Divide National Scenic Trail and would parallel the Chaco Mesa on the northern side. The mesa forms an unusually scenic vista, providing expansive views of surrounding landscapes (Photo 9). Steep vertical uplifts and escarpments extend above the rolling terrain at the foot of the mesa on the south side. Color variation is the result of outcrops of sandstone and shale and intermittent greens of shrubs and grasses on the mesa top. Chaco Mesa has a visual quality rating of B. There are several secondary dirt roads and one highway. Because access to this area is good and public interest is high, the visual sensitivity level is high.

The T2 transmission corridor traverses the eastern side of the Cabezon WSA. The Cabezon WSA has a VRM Class II and visual quality A rating, because of its unique visual characteristics. The WSA consists of Cabezon Peak, a volcanic plug 8000 feet high, surrounded by rolling hills cut by a network of arroyos (Photo 10). The eastern boundary, which the proposed transmission line would follow, is marked by an existing power line (345-kV) right-of-way with wood pole transmission structures approximately 25 feet high.

Transmission Line T1

The 107-mile transmission line would pass through rolling hills with intermingled breaks. Approximately 96 percent of this land is of low visual quality (C rating) and has a Class III or IV VRM rating. The natural landscape features exhibit little variety in form, line, color, and texture. Broad expanses of sagebrush intermingled occasionally with pinyon-pine and juniper are found in the region. Light-colored soils with little variation are characteristic of the landscape. The relatively flat terrain and clear air provide excellent vistas of the open, expansive plains and distant mountain ranges.

Cultural modifications along this corridor include transmission lines, pipelines, range developments, and secondary roads. Visual sensitivity is high because the area is accessible by secondary roads, and views are expansive.

The first 10 miles of the T1 corridor follow County Road 15 along the southern border of De-na-zin WSA (a VRM II area of particular scenic quality). Four miles of the southern portion of T1 would cross the western edge of the Ojito WSA. The Ojito WSA is rated VRM Class II, with visual quality Class A. The WSA consists of steep and rocky terrain, interspersed with several steep canyons. The landscape is rich in both color and form because of horizontal layering and vertical uplifts. Colors range from reds and ochres to light creams. The most visually dominant vegetation along the southern segments is the dark greens of the pinyon-juniper, shrubs, and grasses. The T1 line would cross the proposed Continental Divide National Scenic Trail in a VRM IV landscape of low scenic quality and sensitivity (MP 49).

Transmission Line T3

Ninety-five percent of alternative route T3 would pass through VRM Classes III and IV; 5 percent of the route would traverse VRM Class II land. Much of the landscape can be characterized as undulating hills with scattered tracts of open grasslands. The most prominent vegetation is the grassland type, with sparsely scattered shrubs, pinyon-pine, and juniper. There is little color variation. Randomly located cultural modifications include roads, range developments, residences, and transmission lines. The visual sensitivity in this region is low to medium.

A portion of the proposed corridor runs between the southwestern border of Chaco Culture National Historical Park and its largest outlier. The route continues to the south along the southern edge of Chaco Mesa. These scenic and historic areas possess high-quality features and have therefore been assigned visual quality B and VRM Class II ratings (except the cliff face, which is VRM Class III). Chaco Mesa has also been identified for consideration as a Scenic Area of Critical Environmental Concern (ACEC) in the Management Framework Plan (BLM 1980). The T3 route would cross the proposed corridor for the Continental Divide National Scenic Trail at MP 46 immediately north of Chaco Mesa in a VRM IV area.

Alternative route T3 would cross the Cabezon WSA. This is a VRM Class II area where changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape. The volcanic plug stands as an isolated visual element in the landscape, visible for miles around, and it provides an excellent vista point of distant landscapes. Cabezon Peak is also a popular recreation resource for climbers, hikers, and photographers.

Transmission Line T4

Alternative transmission route T4 would be 120 miles long and pass through national forest lands and BLM lands. Much of the environment through which the corridor would pass is of moderate to low scenic quality. The landscape is common in the physiographic region, with rolling hills intermingled with occasional low, slanting ridges and ledges of bedrock. BLM has assigned this landscape a VRM Class IV and visual quality C rating.

Approximately 10 miles of the corridor would pass through the Cibola National Forest. Almost 90 percent of the route traverses landscapes that have a Modification (M) visual quality rating. Guidelines for this rating state that human activities may dominate the characteristic landscape but must at the same time use naturally established form, line, color, and texture. Natural elements that characterize the forest landscapes include rolling hills and mesas (San Mateo, Mesa Chivato), with ponderosa pine woodlands opening up to montane meadows in the foreground and middleground, contrasted against a backdrop of the San Mateo Mountains and Mt. Taylor. The T4 corridor follows the same general corridor of the lower portion selected for the PNM FC-A-P (500-kV line) connecting the Four Corners Power Plant with the Ambrosia and Pajarito stations. A detailed discussion of visual resources along this line is provided in the Final EIS issued in 1980 by the Bureau of Indian Affairs. Specific areas of note, in addition to those identified above, include the

White Rock formation and the numerous mesa escarpments along the northern side of Mt. Taylor. These geologic formations provide earth colors ranging from tans, grays, and ochres to blacks and reds. The T4 line would cross the proposed corridor for the Continental Divide National Scenic Trail at MP 53 in a VRM IV landscape area.

T5: FC-A-P 500-kV Loop

A 5-mile 500-kV loop from the proposed NMGS plant to the FC-A-P line would consist of parallel transmission lines within a half-mile corridor west of the site.

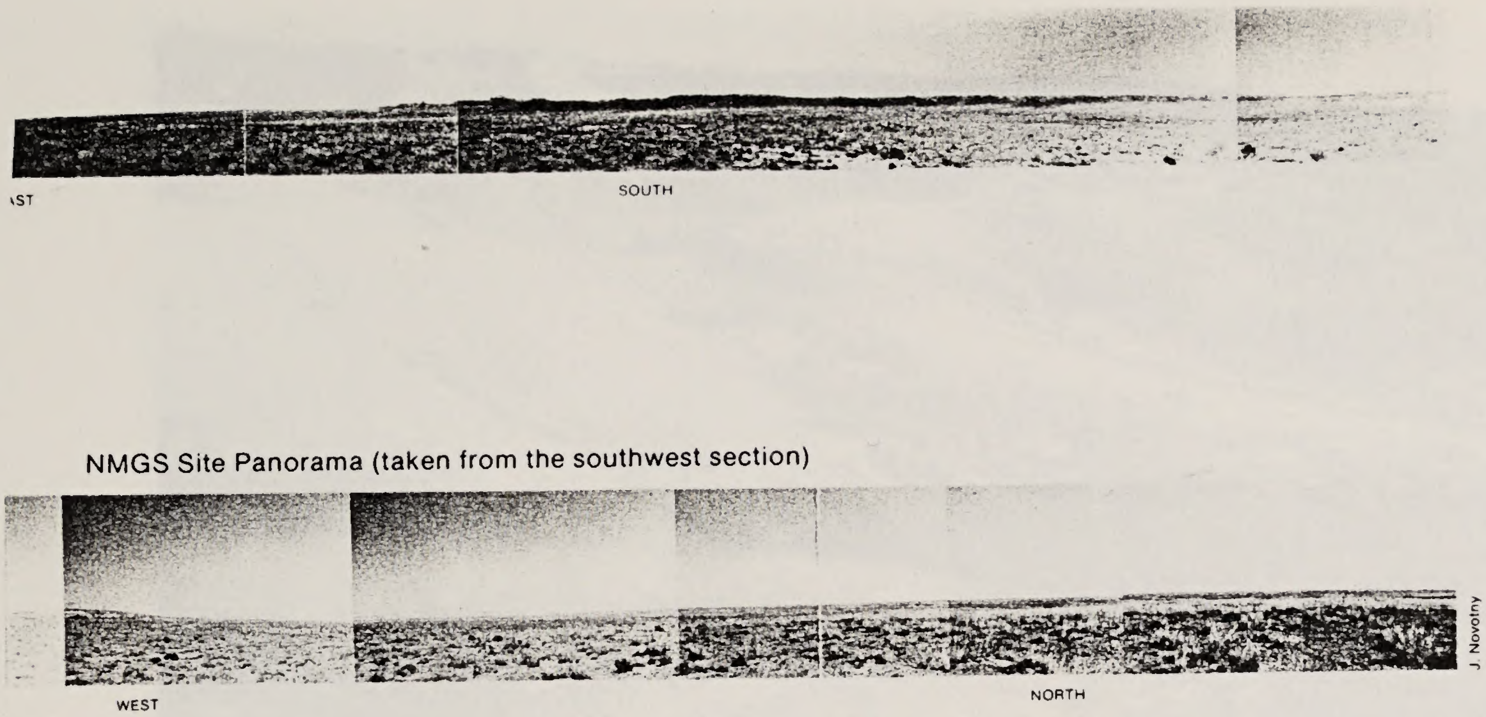

Photo 4. NMGS PANORAMA (from the southwest section)

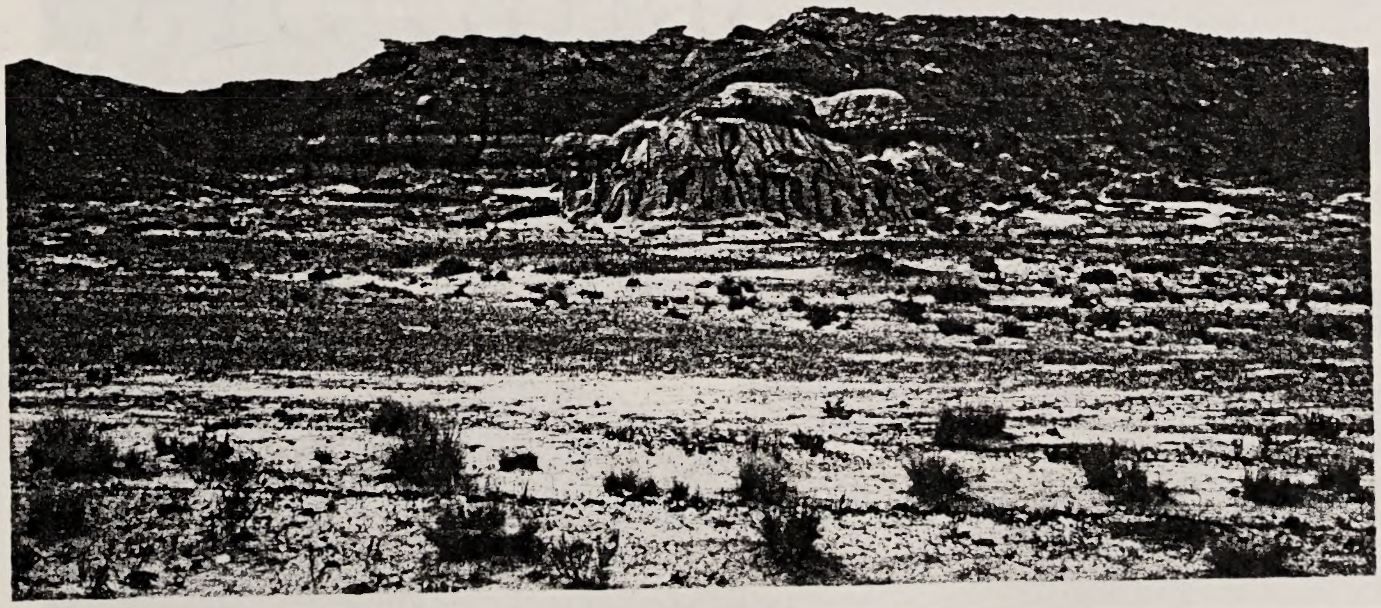

Photo 5. BADLANDS FORMATION AT PLANT SITE

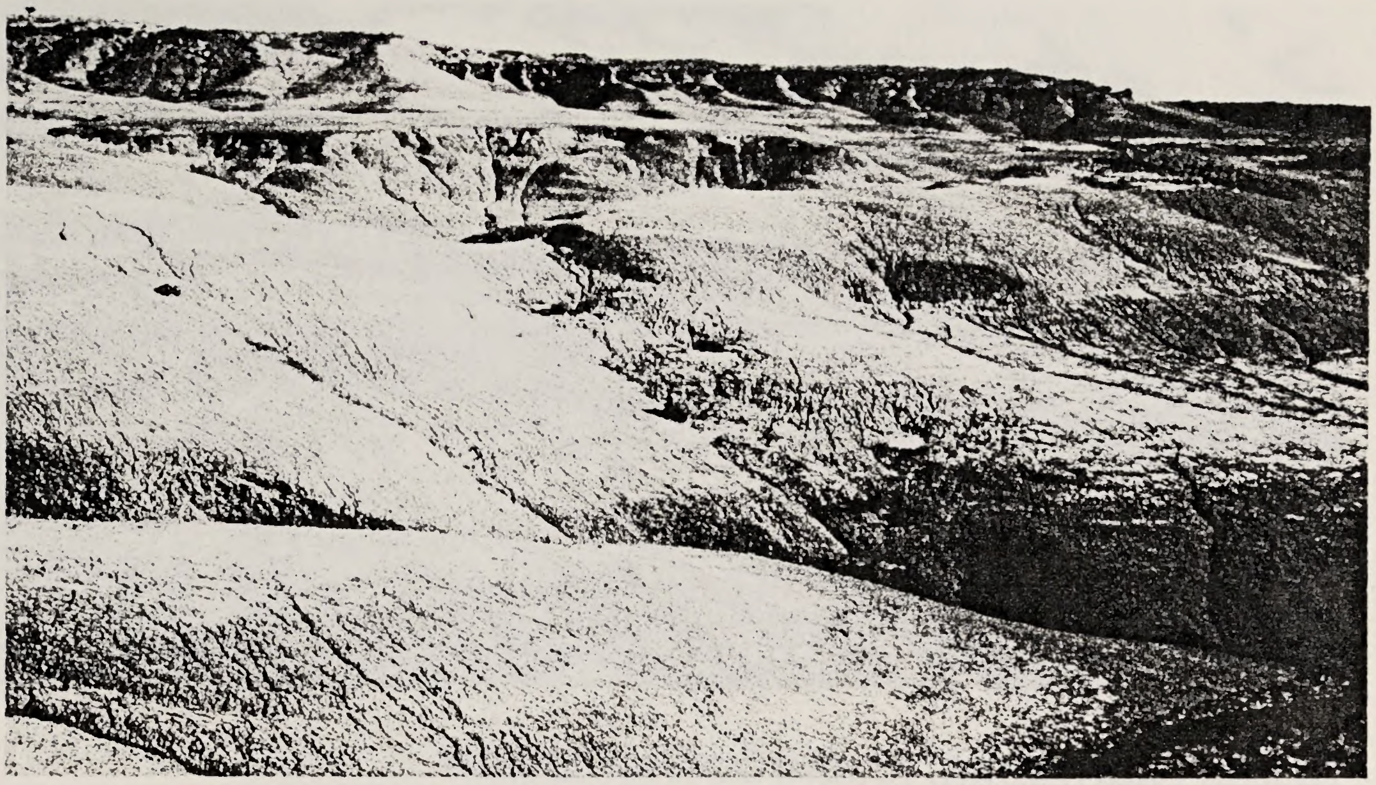

Photo 6. DE-NA-ZIN WSA

Photo 7. BISTI WSA

Photo 8. NAVAJO INDIAN IRRIGATION PROJECT

Photo 9. CHACO MESA

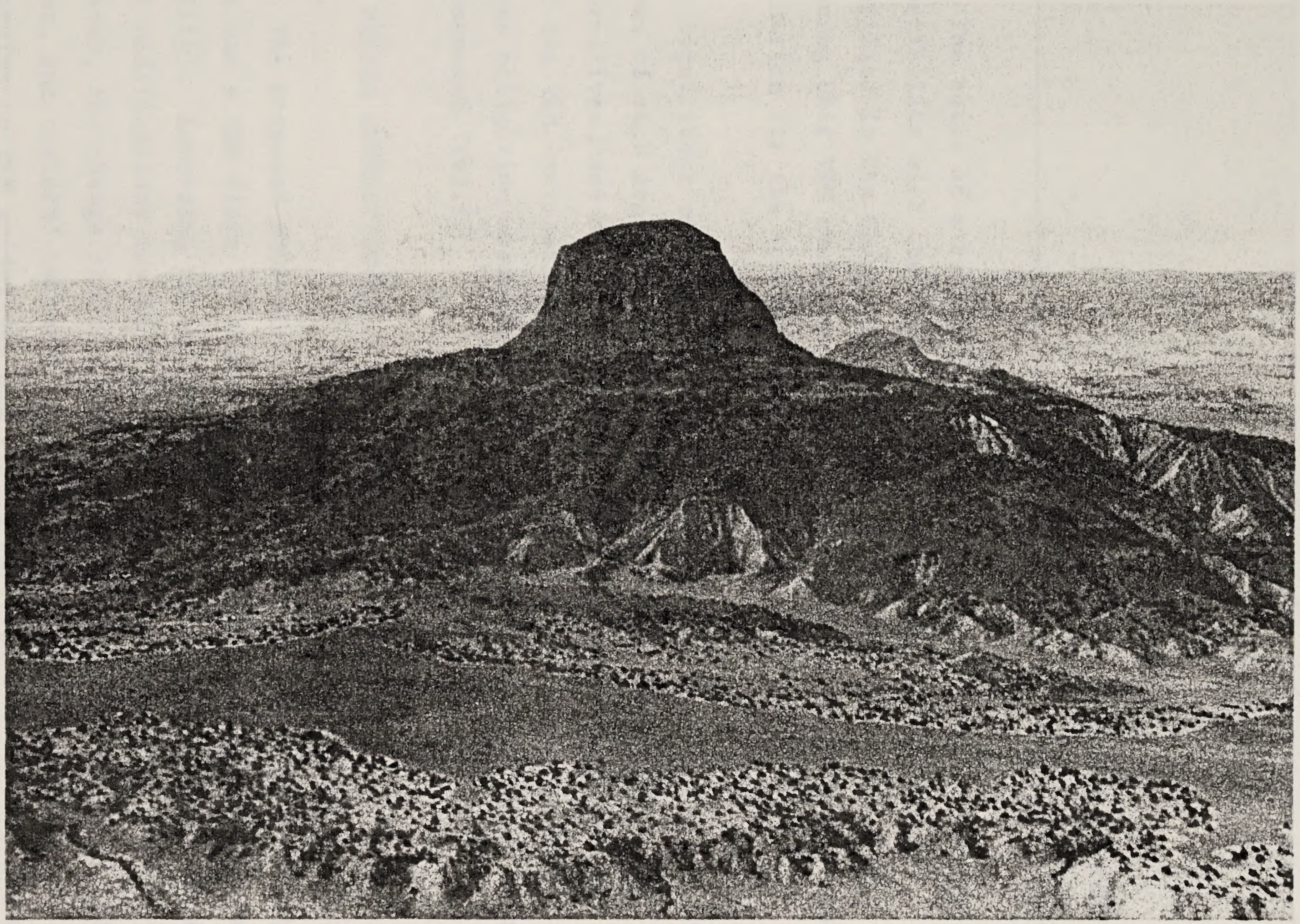

Photo 10. CABEZON WSA

4.0
VISUAL CONSEQUENCES

The basis of a visual consequences assessment is the project's compatibility with the visual resource management objectives identified in the Chaco Planning Unit MFP (BLM 1981), the Chaco Planning Unit VRM evaluation, and the U.S. Forest Service VRM system evaluation for the southern portion of the study area.

Significant visual consequences of the construction and operation phases of each separate NMGS project component, and each of the alternatives, are discussed below. For those components that do not meet the VRM contrast rating objectives, permits could be denied unless mitigation measures were taken to reduce contrasts to within recommended levels.

NEW MEXICO GENERATING STATION SITE

The proposed NMGS plant site is located on 2400 acres of land that has a VRM Class IV rating (low sensitivity and "common" scenic quality). According to the BLM's Chaco Planning Unit MFP, this means that modifications may be a dominant feature in terms of scale; however, the change should repeat the basic elements of form, line, color, and textural interest in the characteristic landscape. According to BLM guidelines and visual resource objectives, the total contrast rating for any feature in a VRM Class IV area should not exceed 20. The total features rating for the category of structures is 25, with form, color, and line most affected; therefore the contrast rating compiled for the proposed plant site does not meet the VRM requirements.

Realizing that the VRM objectives are designed to provide a broad-based, standardized evaluation format that is primarily oriented to preserving natural landscape characteristics, an activity the scale of NMGS cannot help but become a dominant feature and thus exceed the preferred contrast limits. The VRM class could change to Class V in this situation, requiring rehabilitation of the site upon abandonment of the plant.

The characteristic form of the proposed plant structures (Photo 11)* is geometric, with a strong vertical emphasis (the 400- to 575-foot stack,** 240-foot boiler building, 125-foot sulfur dioxide removal system, and 110-foot tanks), and angular or cylindrical shapes dominate (storage tanks, boiler housing, stacks). The forms and lines of the plant facilities would contrast with the dominant horizontal, gently rolling, open terrain that characterizes the foreground, middleground, and background of the site landscape. Most structures and buildings would be metal or corrugated metal painted Rawhide (tan) with Buckskin trim (brown). These colors would contrast with the blue sky and darker color of the background mountains.

The critical viewpoints for the plant are from the highest points of direct vision to the site from within the Bisti WSA (a 3-mile viewing distance) and De-na-zin WSA (6-mile viewing distance). Natural topographic relief would mask all but the top third of the boiler stacks from the selected viewpoint, the highest elevation

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*Photos 11 through 15 are at the end of this chapter.
**Stack height is determined by air quality requirements.

located centrally within the Bisti WSA (see Photo 12, computer simulation viewshed Map 2 and photo simulation record for Bisti, in Appendices A and B). The higher elevations and distant perspectives from the observation point in the De-na-zin WSA would give the viewer an almost full view of the plant to the southwest against the Chuska Mountains (see photo simulation). This perspective forms the background for a number of scenic views from within the WSA. The unnatural form and line of the plant structures and the light reflective color would contrast with the dark-banded Chuska Mountain background in the scenic views to the southwest from De-na-zin. On days when stack or cooling-tower plumes were visible, the viewer's eye would be drawn to the contrasting features.

Two separate studies summarize the visibility and cooling-tower plume conditions for NMGS: (1) Systems Application Inc. performed visibility modeling with the PLUVUE model to evaluate potential visibility impacts related to stack emissions which is discussed in detail in the Air Quality Technical Report; and (2) Environmental Research and Technology, Inc., conducted an assessment of visible plume length and height from NMGS cooling towers (December 1981).

The results of visibility analyses indicate that the plume from NMGS could be slightly visible from the San Pedro Parks Wilderness Area and Mesa Verde National Park. Because of the great distance of these sites from NMGS (75 miles), neither plume perceptibility nor visibility impairment would be frequent or significant. The plume would be infrequently noticeable at Chaco Canyon. These infrequent occurrences were projected for winter, when there are few visitors. During winter, highly visible plumes were projected to occur approximately 3 percent of the time, or 11 days per winter season. During the summer, when visitor use is heaviest, highly visible plumes from NMGS are projected to occur less than 1 percent of the time, or approximately 2 days per summer season. The model did not treat visibility from the closer-in sensitive scenic resources (Bisti and De-na-zin WSAs) because these areas do not fall within Class I EPA criteria.

The following conclusions are derived from the cooling-tower modeling results.

- Only 10 percent of all daytime plumes would extend more than 100 meters downwind from the towers. Only rarely would a plume be visible at distances greater than 2.5 kilometers downwind from the towers.

- Less than 10 percent of the plumes would be visible 100 meters above the cooling towers, and only 1 percent would be visible 200 meters above the towers.

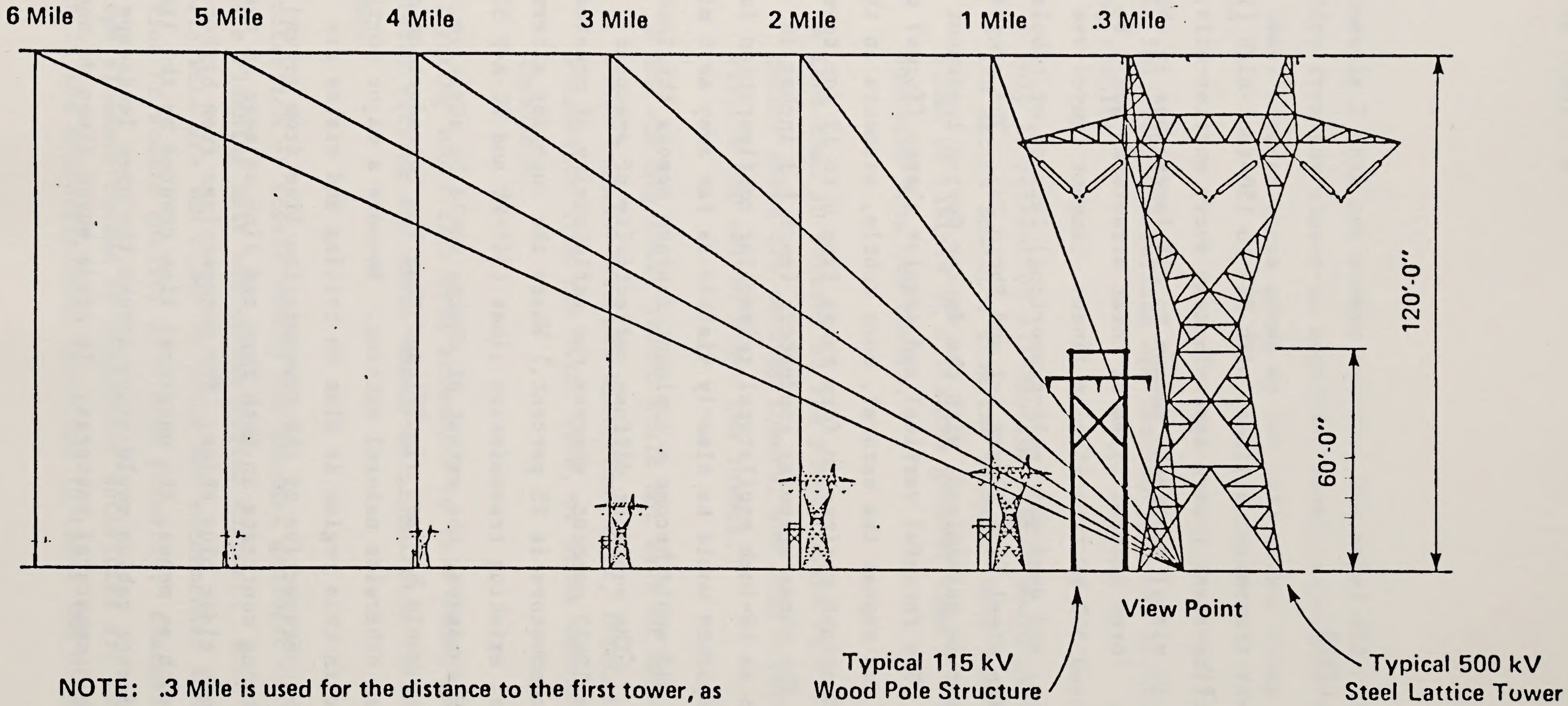
- The cooling-tower plumes would not have an impact on the Chaco Culture National Historical Park, located about 22 kilometers from the Bisti site, or other sensitive locations.

Night lighting would also draw attention to this human modification in the natural setting and would create an illuminated field visible from both WSAs.

Protection of scenic vistas and unusual geologic formations in the Chaco Planning Unit has strong public support. Both the Bisti and De-na-zin WSAs are VRM Class II areas and recommended ACECs, where protection of scenic quality is a high priority. Changes in basic landscape elements caused by management activities are not to be evident in the characteristic landscape in these VRM Class II areas.

TRANSMISSION LINES

The 500-kV transmission lines, with 80- to 150-foot-high (120-foot average), lattice-steel towers approximately every quarter-mile, would result in visual contrasts common to all landscapes in this study region. Three general types of tower structures would be used for the proposed 500-kV transmission lines: tangent (guyed-vee towers), angle, and dead-end (self-supporting) lattice or tubular "see-through" design steel (see Figure 4-1 and Photo 13). The proposed steel treatment is galvanized, with the darker Corten treatment as an alternative. The forceful vertical and angular shapes (forms) of the towers would not repeat the natural, more subtle, elements in the landscape. Contrast ratings in form range from 8 to 12 for tower structures. The three specular conductors (each 1.3 inches in diameter), in an 18-inch equilateral triangular configuration formed by aluminum spacers would be clearly visible as far away as 5 miles (Figure 4-1) and would become a dominant feature across the landscape (or skyline). (The sunlight diffuse reflectivity of specular conductors is 32-35 percent, whereas the reflectivity of treated nonspecular conductors is 25 percent.) Where the corridor alternatives would parallel existing transmission lines (345-kV and FC-A-P 500-kV), pipelines, or roadways, the extent of change would be additive, but in most instances would be less significant than the introduction of a new line in an otherwise natural setting. Because a major portion of the landscape in this region is flat to rolling and vistas are expansive, the perspective of the transmission line from ground level would have strong contrasts in both form and line as seen on the horizon against clear blue skies. For perspectives from higher elevations, such as mesas, the unnatural line created by the linear specular conductor cables would slice across the open landscape in clearly visible unnatural patterns. In areas where lines do not



NOTE: .3 Mile is used for the distance to the first tower, as this is typical tower spacing.

The example illustrates relative height comparisons and does not take the earths curvature into account. The apparent heights of towers beyond two miles would be significantly smaller than the example, due to the earths curvature.

Source: Burns & McDonnell (based on concept by BLM team)

Figure 4-1. VISUAL IMPACT AT VARIOUS DISTANCES

exist, the introduction of a transmission line opens possibilities for corridorization (more lines) in the future.

Insulator units, approximately 5.75 inches long and 10 inches in diameter, made of glazed gray material or glass would add additional bulk to the tower and conductor configuration (PNM 1981). In areas where access roads are not available for construction activities, unpaved roads would be excavated along the transmission corridors. Laydown areas would also be required for construction materials. In soils not amenable to recovery, these access roads would add to the extent of visual contrast.

Visual contrast ratings were completed for sections of the alternative transmission corridors traversing high-quality scenic landscapes, and those within areas of high public interest or visibility. Each is described below.

Transmission Line T2

Four landscape units were identified for detailed analysis along the T2 corridor: Chaco Culture National Historical Park, Ah-shi-sle-pah WSA, Cabezon WSA, and Ojito WSA.

The proposed project would meet the VRM Class IV requirements for the Chaco Culture National Historical Park; the T2 route would be located in a VRM Class IV area. The T2 line would be visible from the northernmost backcountry sites, such as the Pueblo Alto ruins, and from elevated vistas along the southern side of the Ah-shi-sle-pah WSA.

The natural landscape surrounding this corridor already shows evidence of human modifications, such as roads, fenced areas, scattered ranches, and grazing activity. Existing access along this route is excellent, minimizing the need for new access roads. Visual consequences of the T2 line would include the contrast of the towers and conductors with the natural settings. Specifically, the reflectant value of specular conductors and galvanized-steel towers against the mottled light sand color of the homogeneous desert landscape would introduce visually dominant features to the scene. The significance of these contrasts is minimized, however, because the predominant high-quality vistas in both Ah-shi-sle-pah WSA and Chaco sites are in directions away from where the transmission line would be located. For example, in Ah-shi-sle-pah the viewer's attention would be in a northern direction looking into the WSA, and from the Pueblo Alto ruin the viewer's attention would focus on a southwestern perspective of the park.

The T2 study corridor passes into the eastern boundary of the Cabezon Peak WSA, where the project would not meet VRM requirements (Photo 14). The transmission line and towers would contrast significantly against the desert landscape viewed from atop Cabezon Peak. From a bird's-eye perspective, the reflective and angular features of the towers and conductors would attract attention to the unnatural lines and forms of the human modifications. From this vantage point, visual contrasts resulting from the transmission line would be particularly apparent to hikers and photographers visiting the area.

The towers and conductors along the T2 corridor would be partially masked from view by natural topographic relief as seen from the Ojito WSA; this, and the distance factor of 3-5 miles, makes contrasts from this vantage point negligible.

Transmission Line T1

Contrast ratings were completed for three landscape subunits along the T1 transmission corridor: De-na-zin WSA, Cabezon WSA, and Ojito WSA. Mileposts (MP) 0 to 10 would border the De-na-zin WSA. Though the T1 transmission route parallels an existing road (presently unimproved), the towers would result in visual contrasts in vertical line, form, and color. The total contrast of structural features against landscape elements is 23, which exceeds the 20 points allowed for this VRM Class IV area. The sensitivity of the contrast is high because of the proximity to the scenic WSA, and because the transmission line would result in a visual intrusion as viewed from the southeast-facing vistas within the WSA.

Mileposts 80 to 90 would be visible from the western side (and the overlook on the top) of the Cabezon Peak volcanic plug. The panoramic vista from the vantage point atop the peak is highly valued by hikers. This section of the proposed T1 corridor would dominate the more subtle forms and lines of the desertscape below. The contrast rating for features exceeds the VRM Class IV objectives in form, line, and color. The alternative Corten weathered-steel finish on towers would represent the worst case from the bird's-eye perspective because of the high contrast of the dark brown color with the dominant light-sand soil. The proposed galvanized finish would be less obtrusive once it dulls with weathering; however, contrasts in color would still be noticeable.

The section of rights-of-way between MP 90 and 95 would overlap the western edge of Ojito WSA (Photo 15). Though the actual transmission towers and line are planned to remain outside the boundary of the WSA, the right-of-way would encompass a 90-foot swath of land. The contrast rating exceeds the recommended limit for the category of structures by 1, and is most obtrusive in the element of form. The significance of the contrast is moderately reduced because the most highly valued scenic resources in Ojito are located in the central area and along the eastern side of the WSA. The ridge line of the mesa face serves as a natural buffer for views to the west from these interior vantage points, and thus would mask most views of the transmission line. The only sensitive vista points would include those atop the Bernalillito Mesa, where visitors would have to climb for a view of Cabezon Peak to the northwest. From this vantage point the light color and reflective qualities of galvanized steel towers would contrast dramatically against the dark color of Cabezon Peak in the background.

Existing access along the T1 route is limited and would require extensive use of new construction roads. Since a major portion of this route is across semiarid and arid land, and since shale badland topography not amenable to recovery, contrasts in line and color of roads would add to the corridor contrasts.

Transmission Line T3

The T3 line would meet VRM objectives for land it traverses along all but the 5 miles where the corridor would overlap the Cabezon WSA. The T3 route is also within the "seen area" of, and less than 1 mile from, four high-quality VRM Class II resource areas: the southwestern corner of Chaco Culture National Historical Park and the main Chaco outlier; immediately below the southern rim of Chaco Mesa Scenic ACEC; the northern border of La Lena WSA; and the western rim of Ojito WSA. Visual contrasts in line and form would be most pronounced where the towers and conductors of the T3 line are viewed from atop Chaco Mesa and Cabezon Peak. The perspectives from these vistas are expansive (as much as 128+ miles on a clear day). The natural landscape is characterized by gently rolling horizontal terrain crossed with undulating lines of washes and erosion patterns. The unnatural straight line of the transmission conductors and the geometric, vertical form of the towers would create dominant features in the landscape that would detract from the more subtle elements of the natural setting.

Additionally, existing access along this route is poor and would require extensive use of new roads for construction. Contrasts in line and color resulting from disturbance to soils and vegetation would add to the contrasts of the conductors and towers along segments where roads are introduced.

Transmission Line T4

The T4 line is the longest transmission corridor proposed and is the only alternative that would traverse lands managed by the U.S. Forest Service. Since a major portion of this line would use the same corridor as an existing 230-kV line and the previously proposed FC-A-P line, visual consequences already identified in the Final EIS for the FC-A-P 500-kV project (BIA 1980) would be cumulative rather than first-order. The dominant scale and vertical emphasis of the 80- to 150-foot towers of the two proposed lines, along with the strong linear contrast of the specular conductors, would present an additive visual effect. Particularly significant stretches of the corridor include the following: from San Mateo east to the top of Mesa Chivato, the eastern descent off Mesa Chivato, sections visible from Route 279 west of Mesa del Lobo, and where the line comes within view of the access road (Route 334) to the Canoncito Navajo Indian Reservation.

Transmission Line T5 (FC-A-P Loop)

This line would link the proposed plant with PNM's approved 500-kV FC-A-P line. The physical characteristics of towers and conductors would be the same as those described for the proposed transmission lines, and the landscape is similar to that described for the plant. The VRM class for the area traversed by the T5 loop is IV, exhibiting little variety or dominant features.

WATER SUPPLY SYSTEM

Neither the diversion channels, pump stations (with 69-kV transmission line), well fields, nor any of the three underground pipeline alternatives would result in significant visual consequences. Visual contrasts from land disturbance during the construction phase of these components would remain subordinate to the visual strength of the existing landscape elements. The following briefly describes the range of visual consequences along each of the alternative water pipelines.

Water Pipeline P1

The most visually sensitive areas that would be traversed by the P1 line are the steep eroded bluffs and mesas along the southern side of the San Juan River. Since the proposed action includes tunneling through this visually scenic escarpment area, disturbance to the dominant natural horizontal layering and vertical uplifts would remain insignificant, subordinate to dominant features. Some soil disturbance, resulting in minor changes in color and texture, may result from construction activities during the drilling phase. Natural weathering and reseeding would mitigate these contrasts within 2 to 3 years. The remainder of the pipeline route parallels Highway 371, where an unnatural line has already been introduced to the landscape composition.

Water Pipeline P2

Since the P2 line would parallel existing pipeline corridors along major portions of the route (the first 11 miles, and 17 miles through the Navajo Indian Irrigation Project), visual consequences would be insignificant and would be directly tied to soil disturbance during the construction phase. Short-term (less than 3 years) changes in color and line would be visible where the pipeline route borders the western edge of the Bisti WSA along Highway 371; however, these features would remain subordinate to the natural characteristics of landscape elements in the scenic portions of the Bisti.

Water Pipeline P3

Pipeline P3 would also follow existing roads (44 and 15) and pipelines along major portions of the right-of-way. Visually sensitive landscapes traversed by the P3 line include the initial few miles that would cross the Kutz Canyon badlands formation and the 10 miles that would border the De-na-zin WSA. Noticeable contrasts in line and color would result from trenching activities but would remain subordinate to the dominant elements in the natural setting and would diminish after natural weathering and revegetation take place in the 2 to 3 years following construction. Though more than 90 percent of the P3 line would cross landscapes classed as sensitive (e.g., visible from roadways), natural topographic relief and contours would mask all but short sections of the line visible at ground level.

Gathering Lines and Well Field

The common physiographic characteristics of landscapes encountered by these project components and the low-profile characteristics of the introduced features would result in insignificant changes to the visual resources and scenic quality. The one potentially sensitive area is the Fossil Forest in Sections 13, 14, 23, and 24, where construction activities could detract from the naturalness and scenic experience of visitors to the area. Mining activities in the near future will present more pronounced intrusions and will alter the overall natural undisturbed character of the surrounding area.

Water Reservoir

The water storage reservoir would introduce new color and textural features in the semiarid landscapes identified for the proposed and alternative sites. Because of the high-quality aesthetic appeal of water and the lack of natural resources in the area, these reservoirs could have positive visual consequences; however, the positive features would be dominated by the unnatural line, form, and color of the nearby generating plant and transmission lines. Additionally, the protective fencing around the reservoirs and water discoloration could detract from the natural amenities introduced to the landscape and negate any positive contribution.

Diversion Channels and Pump Stations

Neither the proposed nor alternative location for the San Juan River diversion and pump station is in highly scenic or sensitive landscapes. Additionally, revegetation in these areas would take place within 2 years and would help to mask the facilities from public view.

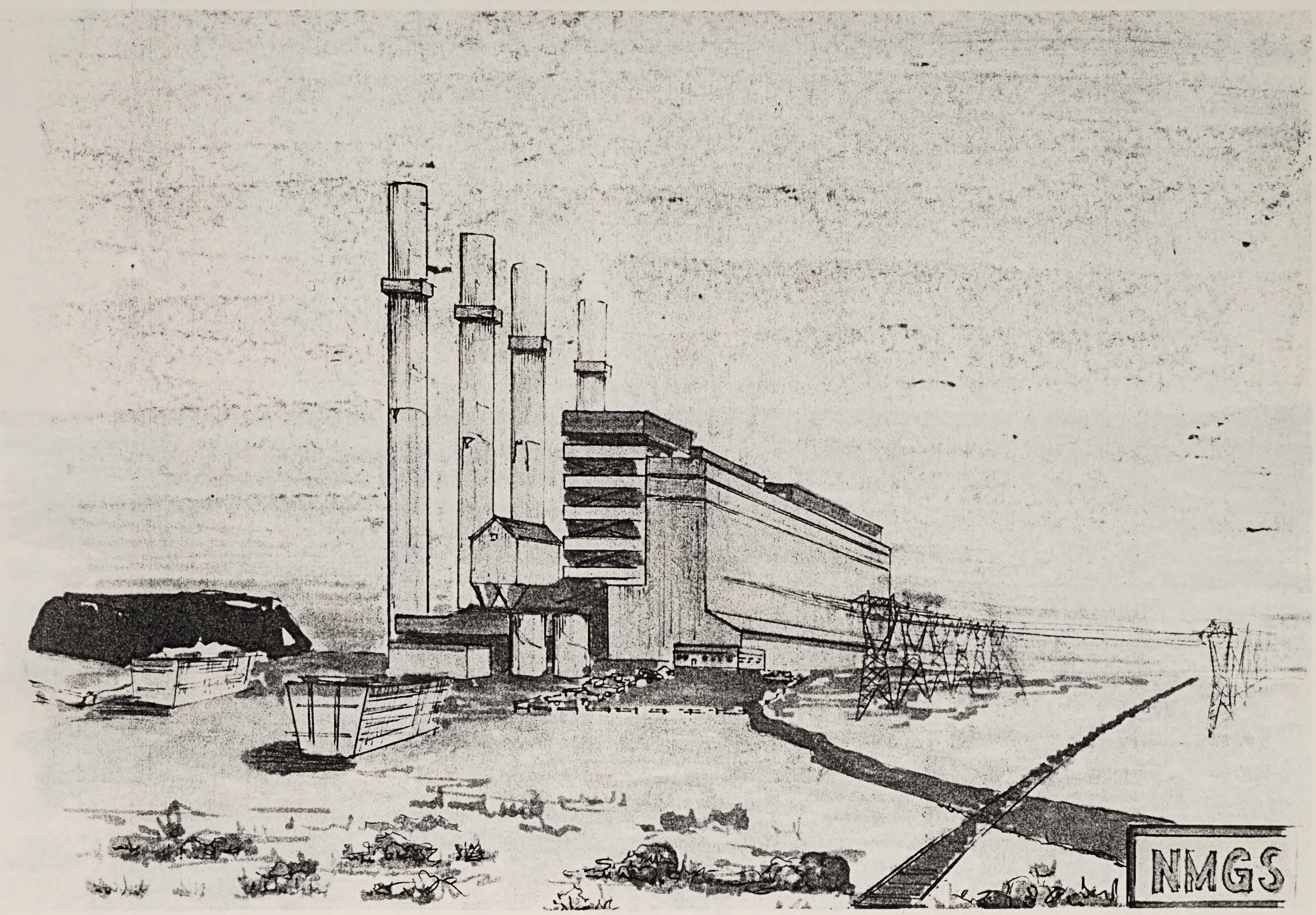


Photo 11. NMGS; NORTH APPROACH

Photo 12. NMGS FROM THE BISTI WSA

Photo 13. TRANSMISSION TOWER

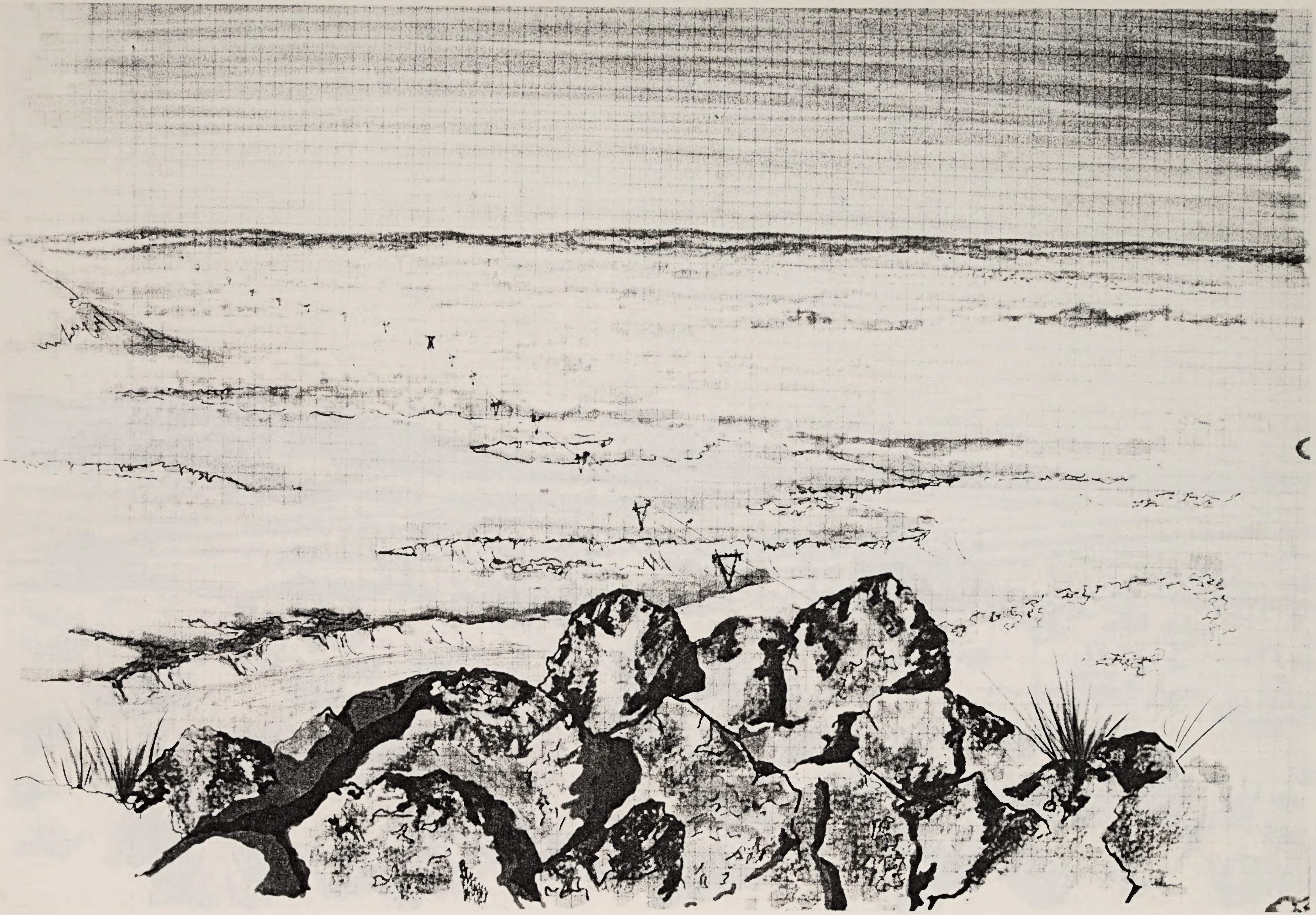


Photo 14. T2 LINE FROM CABEZON PEAK WSA

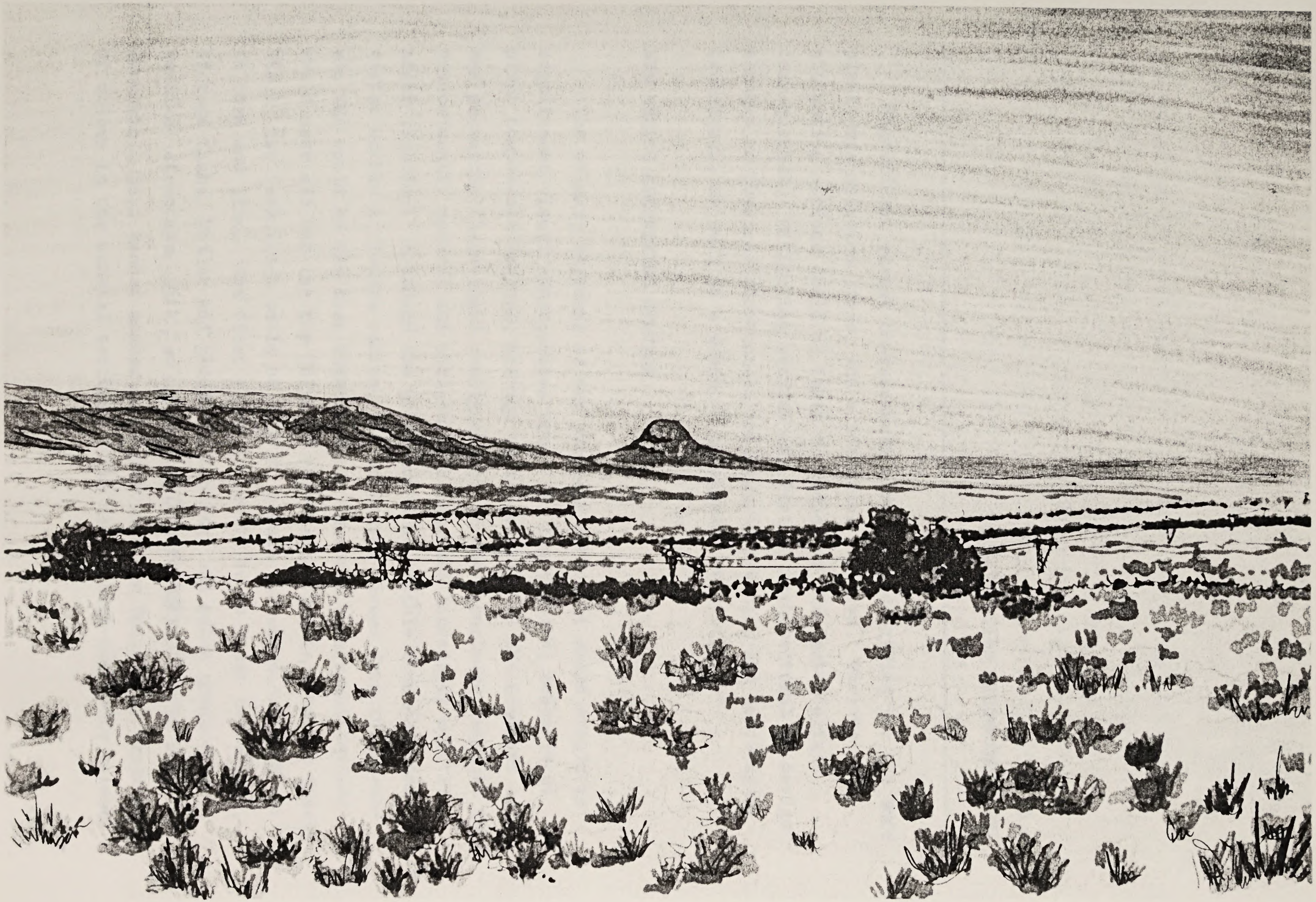


Photo 15. T1 LINE FROM OJITO WSA

5.0

MITIGATION RECOMMENDATIONS

Significant visual consequences have been identified for the NMGS plant, transmission lines, and a potential new town. Various mitigating actions could be taken to reduce or eliminate certain consequences. Mitigating actions can include architectural or design changes to physical structures, resiting components, and landscaping techniques, as well as a range of management suggestions.

NEW MEXICO GENERATING STATION

The primary features of the proposed NMGS that would result in significant visual consequences are: (1) the vertical emphasis of plant components (stacks, storage tanks, etc.); (2) the dominant scale and geometric (hard-edge) configuration of the structures, against the predominantly natural and horizontal background landscape; and (3) night lighting. Although the plant would be visible from numerous vistas within a 12-mile radius, the contrasts viewed from the De-na-zin WSA would be the most significant. (Natural topographic relief would mask all but the top third of the stacks visible from the Bisti WSA.) Two techniques could be used to reduce the extent of contrast in form and line. The first technique would be to treat the stacks, storage tanks, boiler and generator housing, and other massive or vertical structures with two or more colors (sandstone brown with Buckskin), in a banded manner, to blend with the horizontal layering of colors in the natural setting. (The use of high-intensity strobe lights for stacks would meet FAA requirements and avoid the use of red and white stripes otherwise required on vertical structures. Strobe lights can be shaded from ground view. Stacks may be painted to blend with the surrounding landscape if lights are used.) The second technique for reducing contrasts would be the design of earthen berms along the site boundary between De-na-zin and the plant. Excess soil and rock removed during construction of the project could be mounded in berms 15-20 feet high that would serve to mask the bottom portion of the plant and thus reduce the extent of visual contrast.

Night-time illumination consequences would be most sensitive during the early fall and late spring months, when visitation to the WSAs for hiking and overnight camping is highest. Mitigation measures would include controlling any direct glare through the use of shades on lights visible from the WSAs.

The stacks and plant structures should be dismantled and the landscape reclaimed upon abandonment of the project.

Other suggestions for reducing impacts and improving the overall appearance and public image of the plant include: (1) providing waste receptacles at entry and exit points and in parking lots, and maintaining an active waste cleanup both on the plant grounds and along major access roads to the site; and (2) developing a public information and graphics program for NMGS. The program could include development of a professionally designed logo, typeface, and colors specifically for this plant, that could be used in public relations material (displays, flyers, brochures) and that could be incorporated with present PNM graphics for use on company vehicles, plant signs, correspondence, and the like.

Professionally designed signs that identify the plant could be positioned along Highway 371 and County Road 15, where motorists would first see the facility, to inform the public of the nature of the plant and create a positive public image. Sites for the signs should be landscaped with earthen mounds or native rocks (no vegetation is proposed). The color of the signs should be coordinated with the colors of the generating station. Finally, the involvement of professional designers (architects, landscape architects, and graphic designers) to work with plant engineers during the final design preparation should be considered by the proponent.

TRANSMISSION LINES

Mitigation measures for reducing the extent of visual contrast of reflectant conductors and transmission towers include: (1) siting towers where natural topographic relief would mask them from view of sensitive vantage points; (2) using nonspecular conductors along segments identified in Section 4 as significant and sensitive; and (3) treating the lattice-steel towers to match the surrounding landscape in the few visually sensitive areas, such as where the line is within the "seen area" of WSAs, Chaco Culture National Historical Park, and Chaco Mesa ACEC. The paint color sandstone brown, in a matte finish, is recommended for blending with the neutral, light colors of most of the semiarid landscape traversed by the transmission line alternatives. The exception to this is the portion of the T4 alternative (approximately MP 65 to 100) where the corridor traverses the San Mateo Mesa and Cibola National Forest. A flat forest green color would be appropriate there. Other towers in nonsensitive areas could be finished with "Galva prime," a standard matte finish to prevent the reflection of sunlight. An effort should be made to reduce the extent of new access roads being constructed along corridors, and closure of these roads should follow construction to prevent further use and degradation. Oversized desert tires should be used in fragile badlands areas to avoid damage to topography.

6.0

UNAVOIDABLE ADVERSE IMPACTS

The visual features of a development the scale of a power plant, in terms of the dominant form and the unnatural geometric shapes, result in unavoidable visual contrasts which could not meet VRM objectives under any conditions. Features of this size (stacks 400-575 feet high, buildings 240 feet high, and so on) simply cannot be designed to be subordinate to the features in a natural landscape.

Similarly, a high-voltage transmission line with heavy conductors and 120-foot-high towers would have an equally difficult time blending with the natural features of an open, semiarid landscape where vistas are expansive and the dominant form is horizontal.

7.0

RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE AFFECTED ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Most of the visual consequences identified in Section 4 would be mitigated following decommissioning of the plant and transmission system and reclamation of disturbed soils and vegetation. Because some of the disturbed landscapes are within areas that are difficult to reclaim, the definition of "short-term" in this category may have to be extended to 10-20 years.

8.0

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

All landscape modifications would be reversible and retrievable over an extended period of time following decommissioning of the plant and transmission lines.

9.0

COMPARISON OF ALTERNATIVES

Visual consequences would occur regardless of the type of power generation technology. Specific differences are unknown without comparable information on the physical components and site selection of alternatives.

The no-action alternative for the plant would result in no visual consequences to the site landscape.

Minor differences in the extent of visual contrasts are associated with water system components, and none are assessed as significant. The P1 route for the pipeline would result in fewer miles of visual contrasts because the rights-of-way would parallel existing human modifications (Highway 371).

Visual consequences for transmission routes show the T2 route to have the least extensive total mileage of high visual contrast; however, the T1 corridor has the greatest potential for mitigation (with tower painting and use of nonspecular conductors). The T3 corridor would result in the most sensitive contrasts because of its proximity to Chaco Culture National Historical Park, Chaco Mesa Scenic ACEC, and Cabezon Peak WSA. The T4 corridor would have additive consequences for segments paralleling the approved FC-A-P line and would result in the longest total mileage of transmission line.

POSSIBLE NEW TOWN

1.0
AFFECTED ENVIRONMENT

The landscapes in the general vicinity of the plant site, where a new town could conceivably be located, are characterized as being desert open space, with no distinctive landform features. Little color variation exists, and there is little change in texture or form. The surrounding landscapes have saltbush-greasewood vegetation. Other than Highways 371 and 44, only secondary unimproved roads lead to the general vicinity from Farmington. The visual quality rating for the landscapes surrounding the potential new town area is predominantly VRM Class C, with a VRM class rating of IV.

The De-na-zin WSA lies in the general vicinity of sites that could be considered for a possible new town. This WSA occupies 19,000 acres of badlands formation that possesses outstanding scenic qualities as well as valued paleontological resources. The area exhibits rich colors, forms, and textural variation, ranging from light bleached sands to mounds having black and purple soil colors. The natural formations, the presence of petrified logs and fossils, and the expansiveness of the untouched area, all combine to make the De-na-zin WSA highly valued for scenic, educational, and recreation purposes (Photo 4).

The De-na-zin WSA has a visual quality rating of Class A, a high visual sensitivity, and is in a Class II VRM area.

2.0
VISUAL CONSEQUENCES

Since the exact location of a possible new town to house project employees is speculative, site-specific visual consequences cannot be identified; rather, a description of the broad range of possible consequences follows. Basically, two types of visual consequence would result: (1) direct changes to the visual character of the natural setting from the introduction of physical structures (homes and service buildings), utility lines, streets, water and sewage systems, and other ancillary facilities; and (2) indirect changes to the surrounding landscapes from the activities of resident populations (litter, vandalism, visual scars from unauthorized use of off-road vehicles, reduced visibility from auto emissions and wood-burning stoves, etc.).

Landscapes surrounding the site of the proposed generating station, where the new town would conceivably be located, are generally of common scenic quality and low sensitivity, and are designated to be managed as VRM Class IV. The access provided by the two major roads (Highway 371, and Route 15 via Highway 44) to the plant site, and the proximity to the Bisti and De-na-zin WSAs could increase sensitivity in this remote area over future years. Since views are expansive from the elevated portions of the WSAs and roadways, the unnatural form, line, colors, and texture of a human development such as a new town would present a visual intrusion in the open and gently rolling natural landscapes that compose the background scenery viewed from these areas. Visual consequences would be particularly sensitive to WSA visitors, whose expectations include being surrounded by vast, open landscapes formed by the forces of nature, with the imprint of man's work substantially unnoticed, and opportunities for solitude or a primitive and unconfined type of recreation.

3.0

MITIGATION RECOMMENDATIONS

The development of design standards for buildings and structures within the new town is recommended for maintaining the visual character of the area. Specifications would include recommendations for a range of harmonious colors for exterior paint, height limits, sign and lighting standards, and litter control (trash receptacles and routine street cleanup). A visual and noise buffer could be developed along the sides of the new town development facing the WSAs to minimize visual impacts. The buffer could be in the form of earthern berms or a precast concrete or block wall (7 feet high) in a sandstone brown color.

Appendix A
PHOTO RECORDS

VISUAL RESOURCE TASK

PROJECT: New Mexico Generating Station - PNM

DATE: Nov. 4, 1981

PHOTO SIMULATION RECORD: OJITO WSA

FILM: Ektachrome 200

ASA: 200

DIN: 24

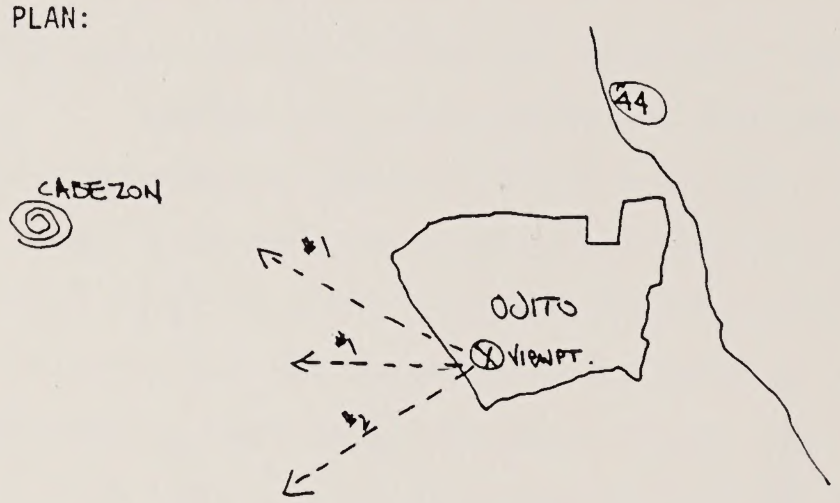
F. Stop 5.6 SS 250

FRAME: 1 & 2

TIME OF DAY: 8:30 A.M.

WEATHER CONDITION: Clear

PLOT PLAN:



ELEVATION: 6000

ANGLE OF VIEW: Horizontal

MAP LOCATION: T: 15 R: 1 W

SECTION: 27/28

DISTANCE FROM LINE (T-1 & T-2): ~~SITE:~~ Less than 1 mile

SCALING DESCRIPTION: Looking N.W. toward Cab. Pk. Over R.O.W. for 1st & 2nd T-lines

DESCRIPTION OF OBSERVATION POINT:

SCENIC QUALITY:

FORM - Horizontal, expansive, background to East provide dominant ~~forms~~ scenic quality, horizontal bands of color
LINE - Undulating and jagged lines of ridges & washes
COLOR - Light tan, some spotted dk. green (veg)
TEXTURE - Mottled, desert shrub
CULTURAL MODIFICATIONS - Existing 340 KV wood pole, pipeline R.O.W.

SENSITIVITY:

VISITOR VOLUME - Low to moderate
VISITOR ACTIVITY - Hiking, photography in W.S.A. primitive unconfined recreation
UNIQUENESS -
DISTANCE ZONES -
VISUAL RANGE - 60 mi.+; background setting

BLM PLANNING UNIT: Chaco P.V.

RECORDED BY: MDA

VISUAL RESOURCE TASK

PROJECT: New Mexico Generating Station - PNM

DATE: Nov. 4, 1981

PHOTO SIMULATION RECORD: CABEZON PEAK

FILM: Ektachrome 200

ASA: 200

DIN: 24

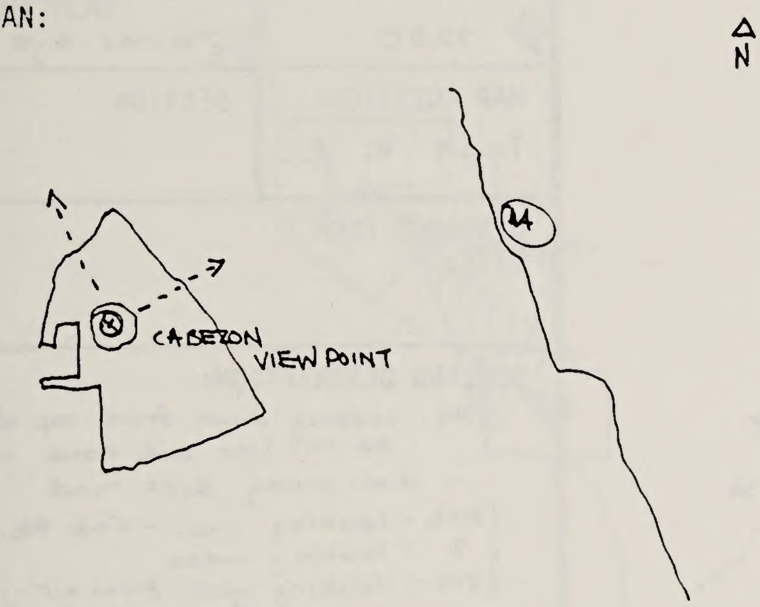
F. Stop SS.

FRAME: see below

TIME OF DAY: 9:00

WEATHER CONDITION: clear

PLOT PLAN:



ELEVATION: 8000

ANGLE OF VIEW: down "birdseye"

MAP LOCATION: T: 16 R: 2.5

SECTION:

DISTANCE FROM SITE: 1 mile from 1st proposed T-line
3 miles from 2nd proposed T-line

SCALING DESCRIPTION: On top cab. peak looking east + north over 1st & 2nd T-lines

DESCRIPTION OF OBSERVATION POINT:

SCENIC QUALITY:

FORM - Highest peak (Volcanic plug) surrounded by rolling hills and arroyos

LINE - Horizontal - mesa & meandering lines of erosion and drainage patterns

COLOR - Tan, reddish brown of sandstone uplifts - neutral and subtle changes in hue

TEXTURE - Mottled, low texture

CULTURAL MODIFICATIONS - Existing 340 line wood poles - blend with landscape very well - difficult to pick out

SENSITIVITY:

VISITOR VOLUME - Low to moderate

VISITOR ACTIVITY - Hiking, sightseeing, photography

UNIQUENESS - Cabezon is, in itself, a unique geological feature

DISTANCE ZONES -

VISUAL RANGE - 60 miles +

Size of area (unit) 8,048 acres
WSA 7,235

Existing Intrusions:
Power line & Road 4

BLM PLANNING UNIT: Chaco

RECORDED BY: MDA

VISUAL RESOURCE TASK

PROJECT: New Mexico Generating Station - PNM

DATE: Nov. 4, 1981

PHOTO SIMULATION RECORD: CHACO MESA

FILM: Ekta. 200

ASA: 200

DIN: 24

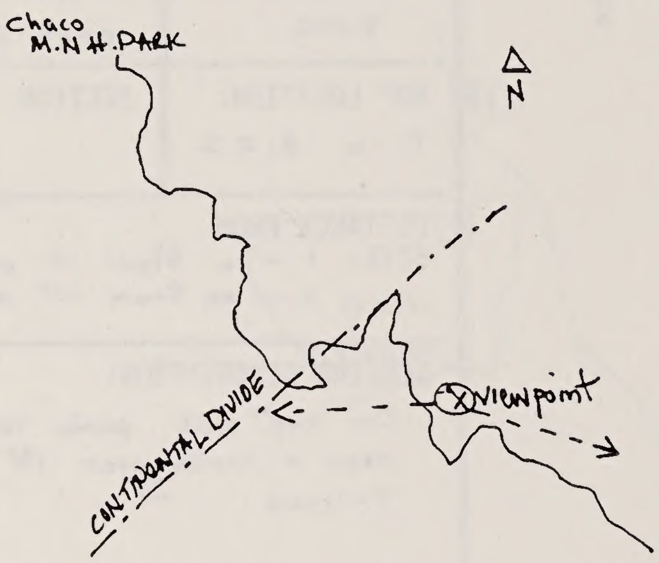
F. Stop SS.

FRAME:

TIME OF DAY: 9:15

WEATHER CONDITION: Clear

PLOT PLAN:



ELEVATION: 7200

ANGLE OF VIEW: birds-eye

MAP LOCATION:
T: 19 R: 8

SECTION:

DISTANCE FROM SITE:

SCALING DESCRIPTION:
#4 looking down from top of mesa to "N" line and road west
- N.W. along dirt road
5+6 - looking s.w. - Cab. Pk.
7 - looking west
8+9 - looking west from air - just north of Pueblo Pint Rd. (1st P. Line)

2 & 3 - looking at Mesa from helicopter across "N" line
3 - Northwest
4 - S.W. along "N"
5 - South at Cabezon

DESCRIPTION OF OBSERVATION POINT:

SCENIC QUALITY:

FORM - Horizontal mesa uplifts, mt. ranges in distant background

LINE - Horizontal sandstone layering dominant in middleground

COLOR - Tans, reds, clear blue sky

TEXTURE - Mottled, desert shrub

CULTURAL MODIFICATIONS - Existing road (unpaved)

SENSITIVITY:

VISITOR VOLUME - Moderate

VISITOR ACTIVITY - Hiking, photography, scenic

UNIQUENESS - Expansive views 360°, Cabezon Peak

DISTANCE ZONES -

VISUAL RANGE - 60 mi.+; middleground and background

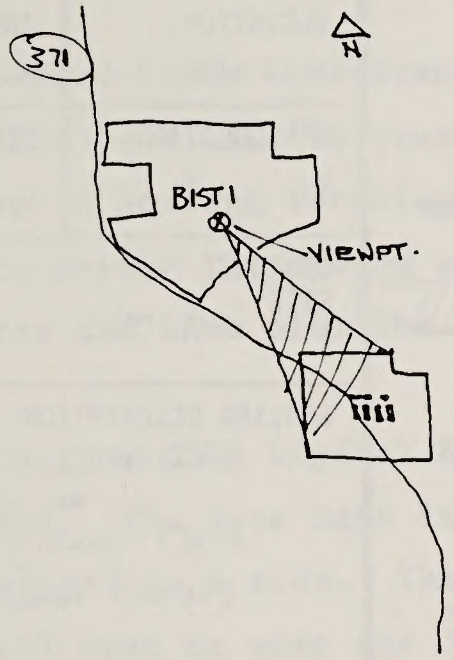
BLM PLANNING UNIT: Chaco

RECORDED BY: MDA

VISUAL RESOURCE TASK

PROJECT: New Mexico Generating Station - PNM				DATE: Nov. 4, 1981
PHOTO SIMULATION RECORD: BISTI WSA	FILM: EKT. 200	ASA: 200 DIN: 24	F. Stop SS. FRAME:	TIME OF DAY: 10:00 AM. WEATHER CONDITION: Clear

PLOT PLAN:



ELEVATION: 5900

ANGLE OF VIEW: Eye Level

MAP LOCATION: T: 23.5 R: 13

SECTION: 33

DISTANCE FROM SITE: 3 miles

SCALING DESCRIPTION:
Stack Ht. - only top 1/3 will show from upper formation in Bisti
Scale - equally horizontal band of yellow sandstone

DESCRIPTION OF OBSERVATION POINT:

SCENIC QUALITY:
FORM - Dominant, badlands, rounded mounds, toadstool forms
LINE - Curving
COLOR - Dark to light greys, whites, reds
TEXTURE - Fine grain
CULTURAL MODIFICATIONS - None

SENSITIVITY:
VISITOR VOLUME - Moderate to high
VISITOR ACTIVITY - Sightseeing, photography
UNIQUENESS - Unusual formation and colors of naturally eroded sandstone
DISTANCE ZONES -
VISUAL RANGE - 50 mi.+; background

(Photo Log)
#6 Chaco Mesa
#7 N toward Pueblo Pintado
#8 Bisti WSA
#11 From air
#12 Inside Bisti
#13 Looking south
(12-14) South to plant site
(2) Looking south

BLM PLANNING UNIT: Chaco P.V.

RECORDED BY: MDA

VISUAL RESOURCE TASK

PROJECT: New Mexico Generating Station - PNM

DATE: Nov. 4, 1981

PHOTO SIMULATION RECORD: De-na-zin WSA

FILM: Ektachrome 200

ASA: 200

DIN: 24

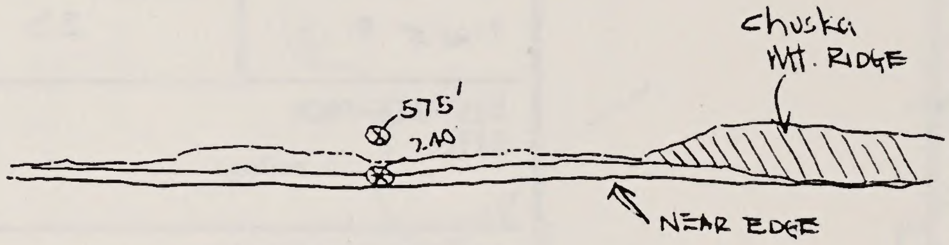
F. Stop SS.

FRAME: 16 + 17, 22 + 24

TIME OF DAY: 12:30

WEATHER CONDITION: Clear

PLOT PLAN:



Looking at site from De-na-zin

ELEVATION: 6200

ANGLE OF VIEW: Horizontal eye level

MAP LOCATION:
T: R:

SECTION:

DISTANCE FROM SITE: 6 mi.

SCALING DESCRIPTION:
(16+17) Looking directly at site
(15) Looking at site
(22-24) Looking at it

DESCRIPTION OF OBSERVATION POINT:

SCENIC QUALITY:

FORM - Horizontal mt. ridges in background, foreground Badlands formations, strong shadowing effect

LINE - Undulating

COLOR - Foreground light tan-sand, background mt. ridge dark maroon

TEXTURE - Fine, pebble foreground

CULTURAL MODIFICATIONS - None visible from this vantage pt., trespass trails and some drilling rigs

SENSITIVITY:

VISITOR VOLUME - Moderate

VISITOR ACTIVITY - Hiking, photography, historic/educational, primitive unconfined recreation

UNIQUENESS - Expansive visual image of moon-like formations, strong impression of solitude

DISTANCE ZONES -

VISUAL RANGE - 60 mi. +; background

BLM PLANNING UNIT: Chaco P.V.

RECORDED BY: MDA

Appendix B
COMPUTER-GENERATED VIEW ANALYSIS

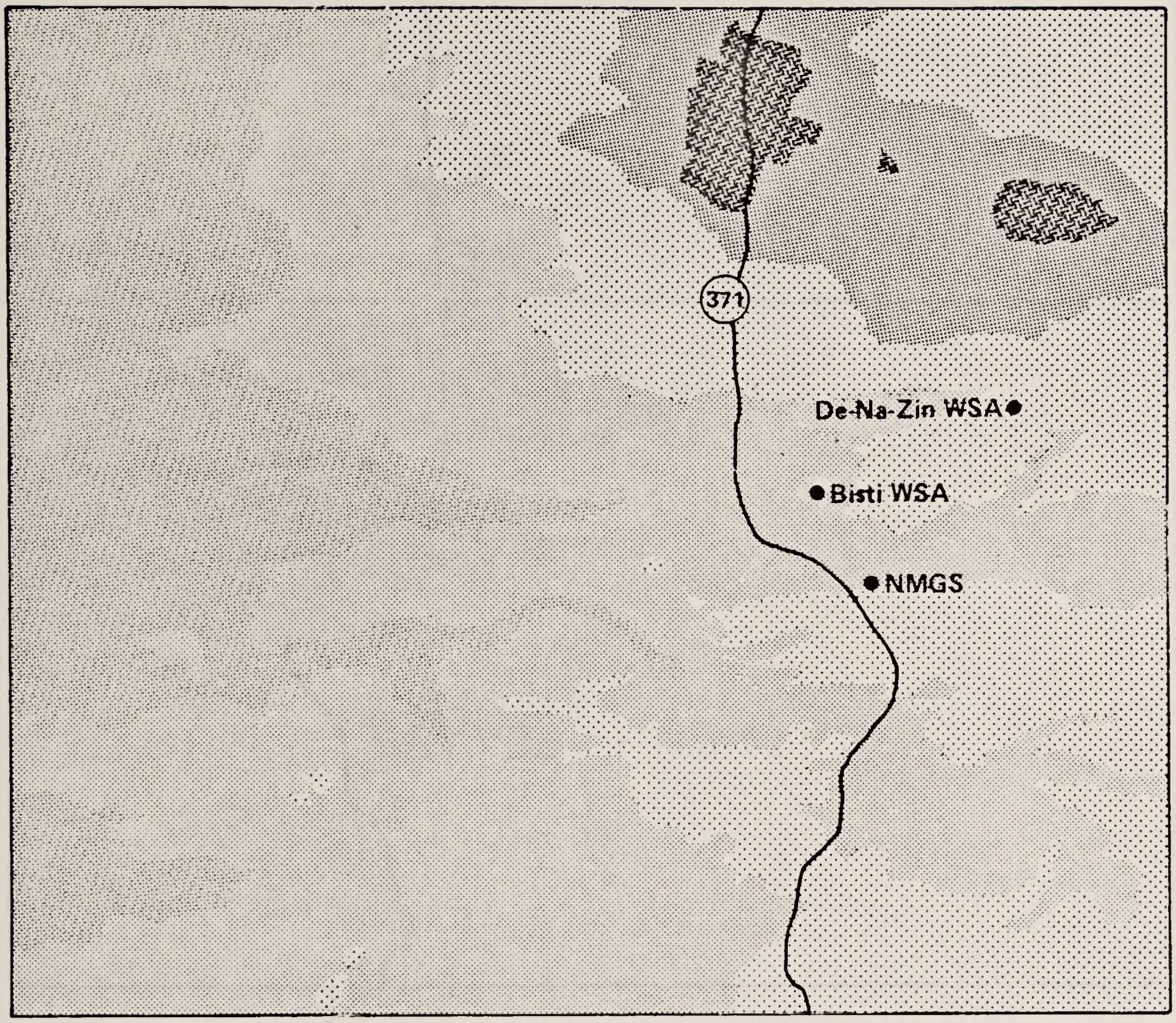
Woodward-Clyde Consultants computerized geographic information system (GIS) was used to cross-check the site inspection and photographic scaling technique and to provide additional simulation reference data. The system was used to simulate the views in the study area and then plot the results in a map format.

Data from USGS Digital Elevation Models (DEM) supplied the topography. The data base in is grid format, each cell 400 meters (0.248 miles) on a side. The study area covers an area about 70 km (44 miles) east to west and 56 km (35 miles) north to south, based on UTM coordinates. The plant site was identified and input to the file by hand.

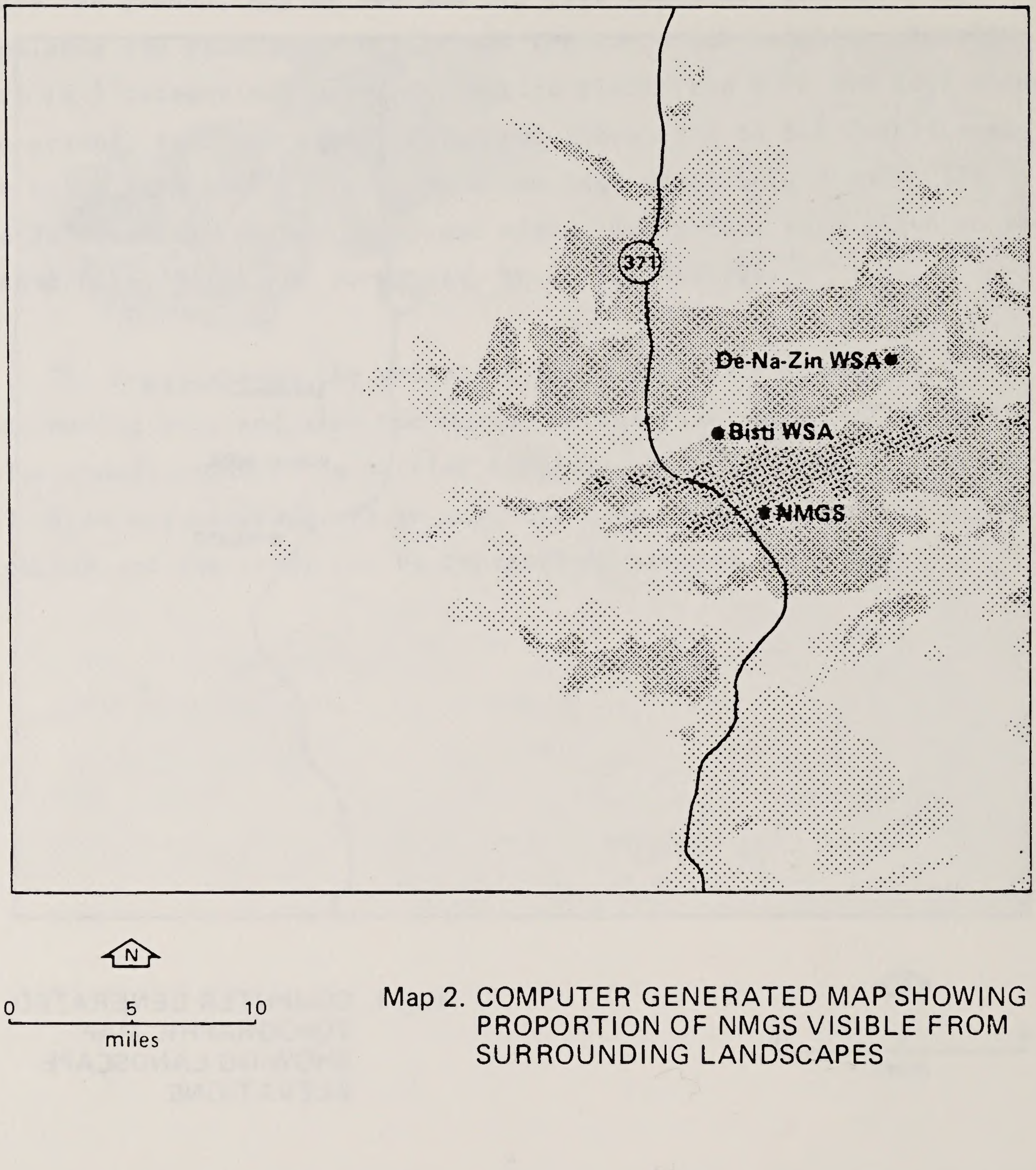
VIEWIT, a program package developed by the U.S. Forest Serivce, was used for the simulation. This program reads the elevation value for each cell and calculates the viewing angle from a designated observer point. If the viewing angle of cell "x" is equal or greater than that of any cell between cell "x" and the observer point, cell "x" can be seen. The program works on all cells in the study area and creates a file that records seen/not seen for each cell. If the program is run more than once, the output file can reflect the results of the multiple runs.

For this analysis, the observer point was the proposed plant site. The program was run four times at ground level; at 240 feet above the ground; and at 400 and 575 feet above the ground. This simulated the plant, the boiler and the two stack heights. Results were in 5 categories: sees the entire plant from 0 to 400 feet above the ground; sees the plant boiler and above (240 to 575 feet); sees the stack from 400-575 feet; sees the high stack height only (575 feet); and does not see the plant site. Two points were added to the output file, Bisti and De-na-zin, to check visibility.

The results show the extent of the plant's visibility on the surrounding area and also the amount of the plant seen. The map is color coded, produced on a color terminal, and photocopied in color. All files and programs are on magnetic tape in Woodward-Clyde's GIS archives and the study can be repeated or revised as needed.



Map 1. COMPUTER GENERATED TOPOGRAPHIC MAP SHOWING LANDSCAPE ELEVATIONS



Map 2. COMPUTER GENERATED MAP SHOWING PROPORTION OF NMGS VISIBLE FROM SURROUNDING LANDSCAPES

☐ Plant not seen

░ Sees top of stacks at 400′ and above

▒ Sees top 1/3 of stacks above 240 ′

▓ Sees full plant from ground level up

● Selected viewpoints

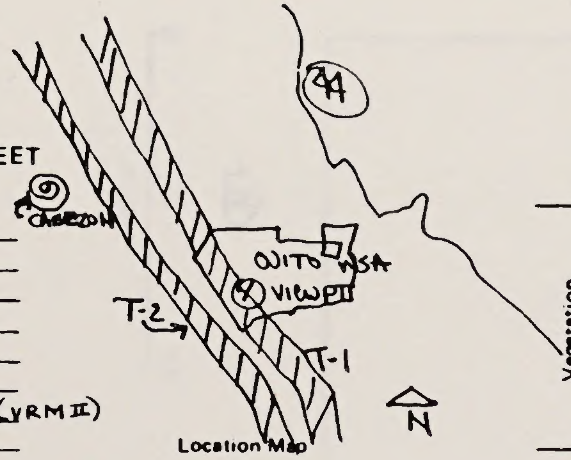
Appendix C

VRM CONTRAST RATING FORMS

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Transmission Line
Location T 15 / R 1 W
Step 3 VRM Class III
Critical Viewpoint Ojito NSA (VRM II)
Date Nov. 4



Location Map

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Dominant horizontal layering of exposed ridges, distant mountains in background
Line Meandering lines of natural drainages and washes.
Color Muted earth tones, pronounced-deep reds on background ridges, layered with light bands
Texture Broken striated - exposed ridges & rock outcroppings

Vegetation

Form Irregular, low bushes, grasses, rounded small clusters on 'higher' elevations
Line Irregular, no discrete edge
Color Dk. green to light tan grasses, dk. brown weathered
Texture Sparse, spotted, mottled

Structures

Form Wood H-Frame
Line Existing 345 KV line, wood pole towers, low contrast
Color Dark brown, matte finish
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form
Line Access roads for construction will disturb soil in unnatural pattern
Color Disturbed soils will alter surface color
Texture

Vegetation

Form
Line Cleared vegetation in unnatural straight line
Color Cleared vegetation will leave unnatural swath of exposed soil color
Texture

Structures

Form 500 KV lattice guyed-vee steel towers 150' H & 4 per mile strong vertical against horizontal backdrop
Line Heavy conductor bundle, specular conductors pick up sunlight, dominant line
Color Galvanized steel reflextant or corten dark
Texture Lattice broken, low contrast, "see-through" structure

4. CONTRAST RATING ( ) SHORT TERM (X) LONG TERM

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	⓪	12	8	4	⓪	⑫	8	4	0
	Line (3x)	9	6	③	0	9	⑥	3	0	9	⑥	3	0
	Color (2x)	6	4	②	0	6	④	2	0	6	4	②	0
	Texture (1x)	3	2	1	⓪	3	2	1	⓪	3	2	①	0
Total		5				10				21			

Maximum element contrast 2 x
Maximum feature contrast 16

Does project design meet VRM requirements ( ) Yes (X) No

Evaluator M. Duffey-Armstrong Date Dec. 1, 1981

The T-1 & T-2 lines would only be visible from the mesa along the western edge of Ojito but would not be visible from the most scenic spots within the W.S.A. because of natural buffers (ridges) from lower elevations

NMGS - Ojito

5. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Transmission toners painted "sandstone brown" and non-specular conductors used between MP 90-95 for T, (proposed route)

6. DESCRIPTION OF ACTIVITY AS REDESIGNED

Land/Water

Form

Line

Color SAME

Texture

Vegetation

Form

Line

Color SAME

Texture

Structures

Form Guyed-vee lattice towers 80-150' high (4 per mile) vertical feature

Line Non-specular conductor-triangulated reflective value 25%

Color Painted towers to blend with surroundings "sandstone brown"

Texture Lattice, broken - "see-through" structure disappears in distance (5 mi.)

7. CONTRAST RATING - REDESIGNED

	Features	Land/Water				Vegetation				Structures			
	Degree of Contrast	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	[✓ 0]	12	8	4	[✓ 0]	12	[✓ 8]	4	0
	Line (3x)	9	6	[✓ 3]	0	9	[✓ 6]	3	0	9	6	[✓ 3]	0
	Color (2x)	6	4	[✓ 2]	0	6	[✓ 4]	2	0	6	4	[✓ 2]	0
	Texture (1x)	3	2	1	[✓ 0]	3	2	1	[✓ 0]	3	2	[✓ 1]	0
	Total	5				10				14			

Maximum element contrast 2x

Maximum feature contrast 16

Does project design meet VRM requirements (X) Yes ( ) No

Evaluator M. Duffey-Armstrong Date 5-4-82

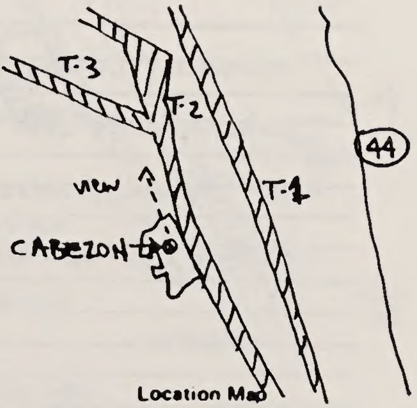
8. RECOMMENDATIONS, COMMENTS

Painting tower structures to blend with foreground will allow natural features (Cabezon) to dominate the view from Ojito WSA. Use of nonspecular conductors will minimize glare along the line during peak sunlight periods.

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Transmission Line
Location T-16 / R 2.5
Step 3 VRM Class II / III
Critical Viewpoint Cabezon Pk.
Date Nov. 4, 1981



2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Cabezon Park is the highest point (8000' elev.) in the area surrounded by Arroyos, open horizontal landscape
Line Meandering erosion patterns, deep washes, irregular line
Color Subtle, earth tones, change in hue where uplifts expose natural layering
Texture Mottled low texture of rock outcropping

Vegetation

Form Low uniform pattern of cacti & desert shrubs & grasses, sparse
Line Irregular
Color Earth tones, sage green, subtle
Texture Mottled

Structures

Form
Line Existing roadway & 345 KV T-line with wood pole towers - low contrast
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form
Line New access road will disturb soils in unnatural line
Color
Texture

Vegetation

Form
Line Unnatural line cut across landscape
Color Clearing vegetation for vehicle access will alter color of ground cover
Texture

Structures

Form 500 KV lattice steel towers (150' H) guyed-vee (approx. 4 per mile) vertical
Line New line, roughly paralleling existing 345 KV line - visually dominant - straight
Color Galvanized steel (reflexant) or corten (weathered)
Texture Lattice broken

4. CONTRAST RATING ( ) SHORT TERM (X) LONG TERM

birds eye view

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	[✓ 0]	12	8	4	[✓ 0]	12	[✓ 8]	4	0
	Line (3x)	9	6	[✓ 3]	0	9	[✓ 6]	3	0	9	[✓ 6]	3	0
	Color (2x)	6	4	[✓ 2]	0	6	[✓ 4]	2	0	[✓ 6]	4	2	0
	Texture (1x)	3	2	1	[✓ 0]	3	2	1	[✓ 0]	3	2	[✓ 1]	0
Total		5				10				21			

II + III

Maximum element contrast 2x

Maximum feature contrast 12/16

Does project design meet VRM requirements ( ) Yes (X) No

Evaluator M. Duffey-Armstrong Date Dec. 1, 1981

Transmission lines T-1 & T-2 will be highly visible from the vista point atop Cabezon Peak & will significantly contrast with the valley floor.

PROJECT NMGS - Cabezon

5. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Transmission Route T_2 + T_3

Paint toners "sandstone brown" and use non-specular conductors between HP 75-85

6. DESCRIPTION OF ACTIVITY AS REDESIGNED

Land/Water

Form

Line

Color SAME.

Texture

Vegetation

Form

Line

Color SAME

Texture

Structures

Form Guyed-vee lattice toners 80-150' high (4 per mile) vertical feature

Line Non-specular conductor - reflectant value of 25%

Color Painted toners blend with surrounding landscape

Texture Lattice broken - "see-through" structure disappears in distance (5 mi.)

7. CONTRAST RATING - REDESIGNED

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	[✓ 0]	12	8	4	[✓ 0]	12	[✓ 8]	4	0
	Line (3x)	9	6	[✓ 3]	0	9	[✓ 6]	3	0	9	[✓ 6]	3	0
	Color (2x)	6	4	[✓ 2]	0	6	[✓ 4]	2	0	6	4	[✓ 2]	0
	Texture (1x)	3	2	1	[✓ 0]	3	2	1	[✓ 0]	3	2	[✓ 1]	0
Total		5				10				17			

Maximum element contrast 2x

Maximum feature contrast [✓ 12]/16

portion in WSA

Does project design meet VRM requirements ( ) Yes (X) No

Evaluator H. Duffey-Armstrong Date 5-4-82

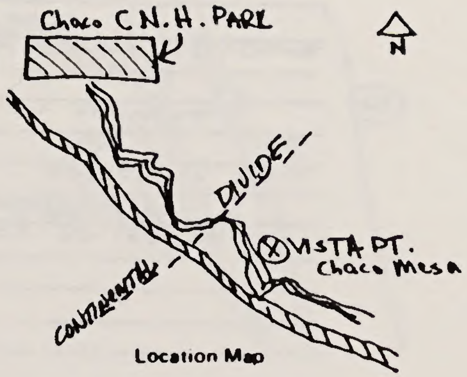
8. RECOMMENDATIONS, COMMENTS

The proximity to this Class II scenic area where the study corridor actually crosses the WSA boundary will not meet VRM objectives, however, mitigation measures would reduce the extent of contrast to within acceptable range

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Transmission Line
Location T 19 - R 8
Step 3 VRM Class IV
Critical Viewpoint Chaco Mesa
Date Nov. 4



Location Map

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Mesa's sheer edges, strong statement of weathering and natural erosion process, open vistas
Line Horizontal sandstone layering dominant in middleground, meandering drainages in middleground
Color Muted earth tones, subtle color changes
Texture Mottled - soft texture of weathered sandstone.

Vegetation

Form Low profile of desert shrub, grasses and cacti on mesas, no veg. on valley floor
Line
Color Dark green on mesa, lighter muted color on valley floor
Texture Spotted clusters, irregular

Structures

Form Prairie dog trading post
Line Existing roads visible from mesa
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form
Line Construction access roads will disturb soils in unnatural line
Color Color of disturbed soils altered.
Texture

Vegetation

Form
Line Removal of vegetation results in unnatural line
Color Clearing of grasses and shrub
Texture

Structures

Form 500 KV lattice, guyed-vee steel towers (4 per mi.) 150' H
Line Transmission line "N"/T-3 runs parallel to C. Mesa along valley floor V 1 mile of vista point, reflects light
Color Galvanized steel reflectant or corten weathered
Texture Lattice broken, blends in distance

4. CONTRAST RATING ( ) SHORT TERM (X) LONG TERM

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Week (1x)	None (0x)	Strong (3x)	Moderate (2x)	Week (1x)	None (0x)	Strong (3x)	Moderate (2x)	Week (1x)	None (0x)
Elements	Form (4x)	12	8	4	⓪	12	8	4	⓪	12	⑧	4	0
	Line (3x)	9	6	③	0	9	⑥	3	0	⑨	6	3	0
	Color (2x)	6	4	②	0	6	④	2	0	⑥	4	2	0
	Texture (1x)	3	2	1	⓪	3	2	1	⓪	3	2	①	0
Total		5				10				24			

birds-eye view

Class IV

Maximum element contrast

Maximum feature contrast 20

Does project design meet VRM requirements ( ) Yes (X) No

Evaluator M. Duffey-Armstrong Date Dec. 1, 1981

Chaco Mesa is one of the most scenic spots in the planning unit, offering distant vistas (120 mi.) to the east. The T-3 line would significantly contrast with the existing landscape viewed from this mesa. Chaco Mesa is an ACEC area and VRM II.

PROJECT NHGS - T3 Chaco Mesa

5. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Paint towers "sandstone brown" and use non-specular conductors between MP 40-60 where T3 passes along valley floor below Chaco Mesa.

6. DESCRIPTION OF ACTIVITY AS REDESIGNED

Land/Water	Form	SAME
	Line	
	Color	
	Texture	
Vegetation	Form	SAME
	Line	
	Color	
	Texture	
Structures	Form	Guyed-vee lattice towers 80-150' high (4 per mi.) vertical feature
	Line	Non-specular conductors - reflectant value of 25%
	Color	Painted towers blend with surrounding landscape
	Texture	Lattice broken - "see-through" structure disappears in distance (5 mi.)

7. CONTRAST RATING - REDESIGNED

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	[✓ 0]	12	8	4	[✓ 0]	12	[✓ 8]	4	0
	Line (3x)	9	6	[✓ 3]	0	9	[✓ 6]	3	0	9	[✓ 6]	3	0
	Color (2x)	6	4	[✓ 2]	0	6	[✓ 4]	2	0	6	4	[✓ 2]	0
	Texture (1x)	3	2	1	[✓ 0]	3	2	1	[✓ 0]	3	2	[✓ 1]	0
Total		5				10				17			

Maximum element contrast -

Maximum feature contrast 20

Does project design meet VRM requirements (X) Yes ( ) No

Evaluator M. Duffey-Armstrong Date 5-4-82

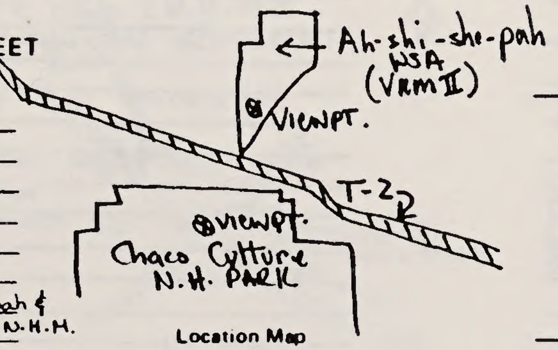
8. RECOMMENDATIONS, COMMENTS

Changes would meet Class IV objectives for landscape viewed from Chaco Mesa (a Class II ACEC Scenic Area)

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Transmission Line
Location T-22 \ R-10
Step 3 VRM Class IV
Critical Viewpoint Ah-Shi-sle-pah & Chaco C.N.H.M.
Date Nov. 4, 1981



Location Map

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Flat to rolling; Badlands type in WSA
Line Irregular lines resulting from drainage patterns and subtle color changes
Color Desert tans, muted
Texture Spotted, mottled

Vegetation

Form Banded areas of low desert grasses and cacti
Line Irregular
Color Dark green
Texture Mottled

Structures

Form Scattered mobile units, historic ruins within Chaco C.N.H.M.
Line Existing unimproved roads, wire fences surrounding Chaco
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form
Line
Color
Texture

Vegetation

Form
Line
Color
Texture

Structures

Form 500 KV line lattice towers 150' H 4 per mi.
Line New line introduced - straight
Color Galvanized steel reflextant or corten dark
Texture lattice, broken

4. CONTRAST RATING (   ) SHORT TERM (X) LONG TERM

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	0	12	8	4	0	12	⑧	4	0
	Line (3x)	9	6	3	0	9	6	3	0	9	⑥	3	0
	Color (2x)	6	4	2	0	6	4	2	0	6	4	②	0
	Texture (1x)	3	2	1	0	3	2	1	0	3	2	①	0
Total		0				0				17			

Maximum element contrast

Maximum feature contrast 20

Does project design meet VRM requirements (X) Yes (   ) No

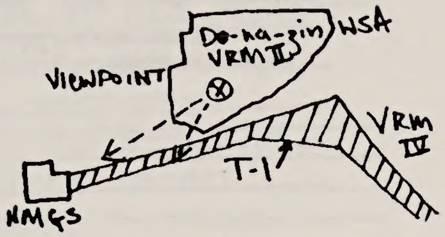
Evaluator M. Duffey-Armstrong Date Dec. 1, 1981

The T-1 Corridor is outside the VRM II area and meets class IV objectives. However, this line will be very visible from selected vistas in Chaco C.N.H.M. (Pueblo Alto Ruins) and from some viewing points within Ah-shi-she-pah.

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Transmission Line
Location T 23 R 13
Step 3 VRM Class IV
Critical Viewpoint De-na-zin WSA
Date Nov. 4, 1981



Location Map

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Gently rolling to flat, open expansive vistas with Badlands within WSA boundaries
Line Horizontal dominant
Color Light tan, grays, muted earth tones
Texture Fine sand pebble, uniform

Vegetation

Form Clusters, low rounded, irregular
Line
Color Dk. green, some blues, purple, reds in spring blossom
Texture Mottled, sparse

Structures

Form
Line County rd. 55 - unimproved low contrast
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form
Line
Color
Texture

Vegetation

Form
Line
Color
Texture

Structures

Form 500 KV line, lattice guyed-vee structures (150' H) every 1/4 mi. strong vertical
Line Vertical towers
Color Silver/grey of galvinized steel or dk. brown of corten weathered
Texture Open lattice

4. CONTRAST RATING ( ) SHORT TERM (X) LONG TERM

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	4	0	12	8	4	0	12	⑧	4	0
	Line (3x)	9	6	3	0	9	6	3	0	9	⑥	3	0
	Color (2x)	6	4	2	0	6	4	2	0	6	④	2	0
	Texture (1x)	3	2	1	0	3	2	1	0	3	2	①	0
Total		0				0				19			

Maximum element contrast
Maximum feature contrast 20

Does project design meet VRM requirements (X) Yes ( ) No

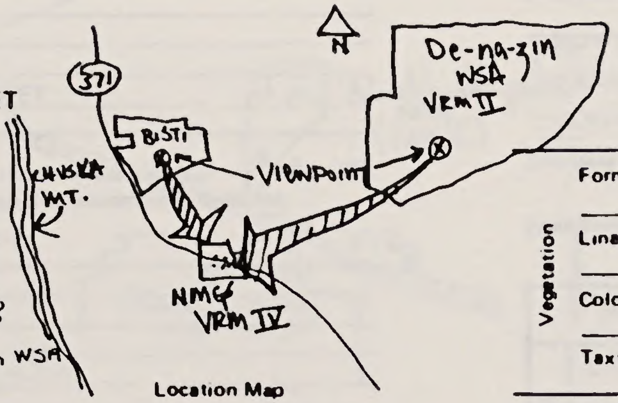
Evaluator M. Duffey-Armstrong Date 12-11-81

Transmission line & towers would be visible from the De-na-zin WSA VRM II area along the southern facing mesas.

VISUAL CONTRAST RATING VIEWSHEET

1. PROJECT INFORMATION

District Albuquerque
Planning Unit Chaco
Project Name NMGS
Activity Power Plant
Location T 23/R 13 Sect. 23, 24, 14, 13
Step 3 VRM Class IV
Critical Viewpoint Bisti & De-na-zin WSA
Date Nov. 4



Location Map

2. CHARACTERISTIC LANDSCAPE DESCRIPTION

Land/Water

Form Flat to gently rolling in foreground - dominant badland type relief in s.w. corner of sect.
Line Predominantly horizontal, moderate interest in flowing lines of De-na-zin wash patterns
Color Desert tans, light predominate - dominant interest in darker reds, purple & bk. in badlands area
Texture Fine sand texture overall to rounded spires & mushroom shapes of Badlands

Vegetation

Form Irregular, low desert grasses spotty
Line Horizontal
Color Dark green & light tan
Texture Spotted small clusters

Structures

Form Air quality monitoring station
Line Existing State 371 cuts through site
Color
Texture

3. PROPOSED ACTIVITY DESCRIPTION

Describe in terms of form, line, color, and texture introduced or modified
refer to BLM manuals for proposed descriptions and requirements

Land/Water

Form Site will be recontoured for plant facilities - some of badlands formations could be disturbed
Line Railroad introduced - grading & levelling
Color Evaporation ponds (100 acre + 150 acre) will introduce new color
Texture Paved areas (parking)

Vegetation

Form
Line
Color Cleared site
Texture Cleared site

Structures

Form Dominant geometric and strong vertical form introduced with hard edges - contrast in vertical emphasis & scale
Line Transmission line, rail & roadway all introduced contrasting straight angular line
Color Tan, gray - shadowing effect of massive structures in day & glare from night lighting
Texture Smooth surfaces

4. CONTRAST RATING ( ) SHORT TERM [✓ (X) LONG TERM]

Features		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	⑧	4	0	12	8	4	0	⑫	8	4	0
	Line (3x)	9	6	③	0	9	6	3	0	9	⑥	3	0
	Color (2x)	6	④	2	0	6	4	②	0	⑥	4	2	0
	Texture (1x)	3	②	1	0	3	2	①	0	3	2	①	0
Total		17				3				25			

Maximum element contrast

Maximum feature contrast 20

Does project design meet VRM requirements ( ) Yes [✓ (X) No]

Evaluator M. Duffey-Armstrong Date Dec. 11, 1981

The scale and vertical emphasis of the plant components (stacks 575' high, boilers, storage tanks) will contrast markedly with the horizontal character of the existing landscape. The upper portion (top ⅓) of the stacks and the plume on some days, will be visible in the background from viewing points on elevated portions within the Bisti WSA (3 mi.) and De-na-zin (6 mi.)

NHGS - Plant Site

5. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Paint structures in 2 colors in layered pattern for obliterative countershading effect to blend with distant background viewed from De-na-zin WSA. Colors: sandstone brown, rawhide, warm gray. Use strobe lights for FAA requirements on stacks and specify 2-tone cement colors for layering of stacks to reduce vertical contrast. Earth berm along northeast side of plant to further reduce scale of buildings from sensitive viewpoint

6. DESCRIPTION OF ACTIVITY AS REDESIGNED

Land/Water

Form Earth berms add natural contour to break unnatural form + scale of plant.

Line

Color

Texture

Vegetation

Form

Line SAME

Color

Texture

Structures

Form Reduced perception of strong vertical features with layering effect

Line Hard-edged lines remain

Color Blend with distant background and foreground

Texture

	Features	Land/Water				Vegetation				Structures			
	Degree of Contrast	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
Elements	Form (4x)	12	8	④	0	12	8	4	⓪	⑫	8	4	0
	Line (3x)	9	6	③	0	9	6	3	⓪	9	⑥	3	0
	Color (2x)	6	④	2	0	6	4	②	0	6	4	②	0
	Texture (1x)	3	②	1	0	3	2	①	0	3	2	①	0
Total		13				3				21			

Maximum element contrast –

Maximum feature contrast 20

Does project design meet VRM requirements ( ) Yes (X) No

Evaluator M. Duffey-Armstrong Date 5-4-82

8. RECOMMENDATIONS, COMMENTS

Mitigation measures would reduce the extent of visual contrast, however, the scale of this plant and strong vertical features in this open, horizontal setting do not lend themselves to blending with the natural landscape. The plant will be a dominant feature regardless of attempts to replicate natural elements.

GLOSSARY

Area of Influence--the primary study area included a 12-mile radius around the plant site; 5 miles either side of transmission corridors; and 3 miles either side of water pipelines.

Color--the property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects.

Contrast--the effect of a striking difference in form, line, color, or texture of a landscape's features.

Cultural Modification--any man-made change in land, waterform, or vegetation (roads, bridges, buildings, fences); the addition of a structure which creates a visual contrast to the natural character of a landscape. A negative cultural modification is disharmonious with the existing scenery. A positive cultural modification can actually complement and improve a particular scene by adding variety and harmony.

Form--the mass or shape of an object, which appears unified; often defined by edge, outline, and surrounding space.

Harmony--the combination of parts into a pleasing or orderly whole; congruity; a state of agreement of proportionate arrangement of form, line, color, and texture.

Line--the path that the eye follows when perceiving abrupt differences in form, color, or texture. In the landscape, ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as line.

Short-Term Impacts--landscape contrasts lasting from 2 to 5 years in areas of low to moderate sensitivity.

Texture--the visual manifestation of the interplay of light and shadow created by variations in the surface of an object.

Variety--the condition of having differentiated parts; the absence of monotony or sameness.

VRM--the Visual Resource Management program developed as a standardized process for inventorying landscapes on public lands and used for evaluating proposed modifications.

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- Albuquerque District Office
- Farmington Resource Area Headquarters, Farmington
- Rio Puerco Resource Office, Albuquerque